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26 JUN 1911

# The Journal

## OF THE

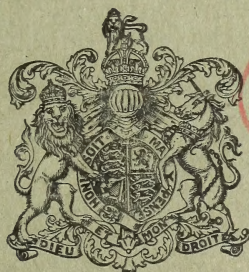
# BOARD OF AGRICULTURE

JUNE, 1911.

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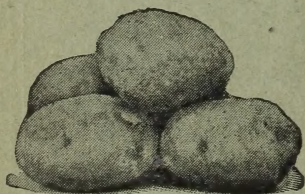


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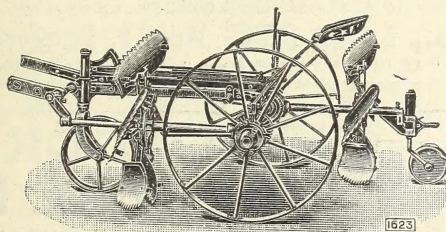
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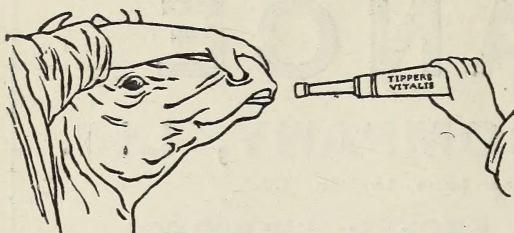
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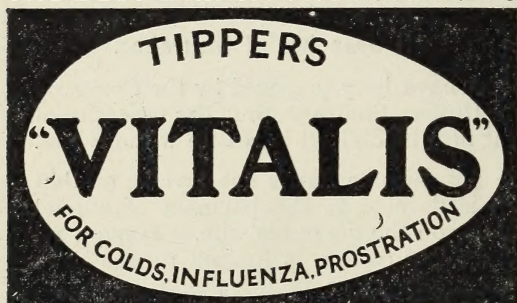
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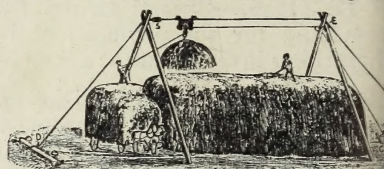
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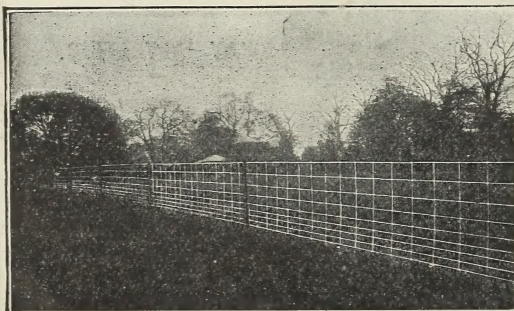
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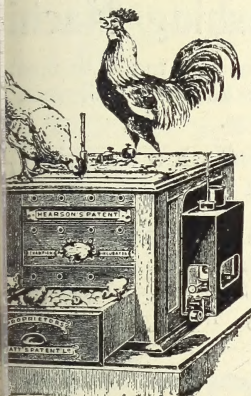




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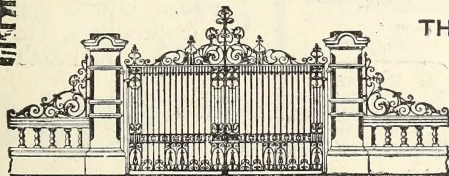
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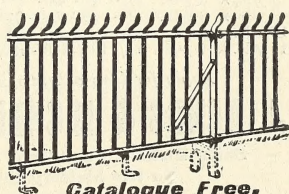


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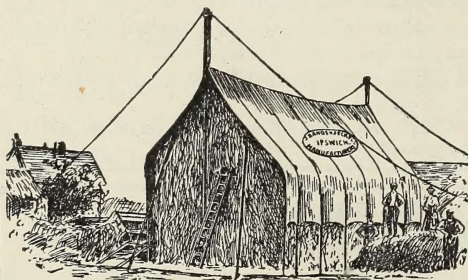
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## NOTICE.

Communications respecting the contents of this Journal should be addressed to the Secretary, Board of Agriculture and Fisheries, 4, Whitehall Place, London, S.W. Messrs. Laughton & Co., Ltd., 3, Wellington Street, Strand, W.C., are the Sole Contractors for Advertisements in the Journal, and communications respecting Advertisements must be addressed to that firm and not to the Board of Agriculture.



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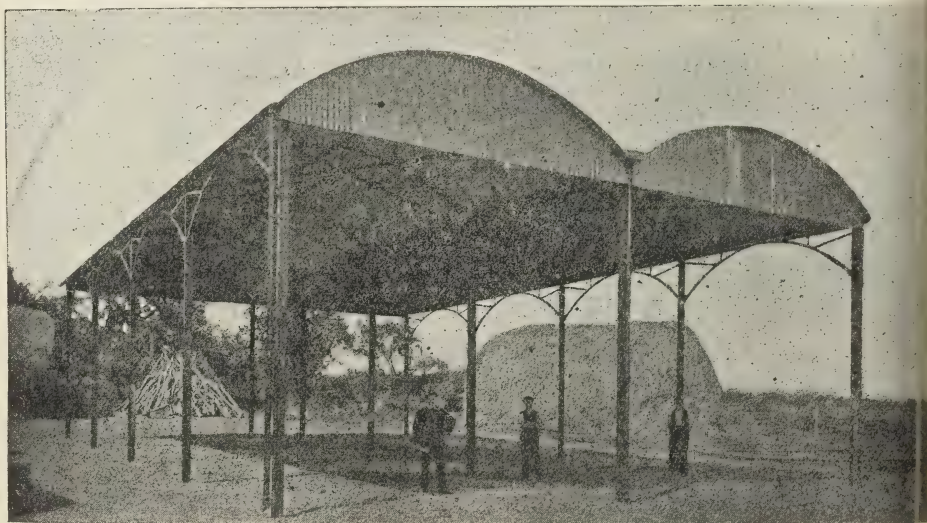
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26 JUN 1911



# THE JOURNAL OF THE BOARD OF AGRICULTURE

Vol. XVIII. No. 3.

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JUNE, 1911.

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## THE "KINGSTON" CHEESE.

A CHEESE FOR SMALL-HOLDERS AND OTHERS.

ALEC. TODD AND WILFRID SADLER.

*Midland Agricultural and Dairy College, Kingston, Derby.*

MERCHANTS of dairy produce have frequently asked makers to produce small Cheshires or Leicesters, varying from 1 to 2 lb. in weight, because they have known that the right article of such a size would meet with a ready sale, provided the quality could be relied upon.

The chief difficulty hitherto experienced has been that practically all attempts to reproduce in miniature such cheeses as Cheddar, Cheshire, Leicester, or Derby, have resulted in a cheese having a thick rind, thus causing much waste when cut up, and also one which failed to ripen properly, due to the fact that it dried up and became hard and chalky in texture, with little or no flavour.

In many cases the processes of manufacture and treatment have been identical with those adopted in the make of the larger cheeses, except that on the curd being ready for grinding small moulds of the required size have been substituted for the usual larger ones.

Naturally, the results have been unsatisfactory. After much preliminary experimental work, we have been able to devise a system which, if carefully followed, will produce a small cheese varying in weight from 1 to 2 lb., which embraces the qualities of a hard-pressed variety, and yet which is ripe and ready for consumption ten days after making.



In placing before the public a description of the "Kingston" cheese, and the methods adopted in its manufacture, we have in view three main objects:—

Firstly, to point out that it supplies a demand for a cheese of a size suitable for the table of the average householder; one which, as regards early maturity and the incorporation of moisture bears some relation to certain classes of soft cheese, while at the same time it possesses the distinctive quality of a typical ripened hard-pressed cheese with respect to flavour and texture.

Secondly, the utensils required and the accommodation necessary for the making and ripening do not require to be considerable, and makers of small means and limited space can attain quite satisfactory results.

Thirdly, it should be a particularly suitable cheese for small-holders to make. The amount of milk required would not necessitate the keeping of many cows, and the fact that the ripening process is rapid means little loss of weight during ripening, and also provides for a quick return financially; while the actual time involved during the process of making is comparatively small.

The illustration on page 195 will give a general idea of the shape and size of the cheese. While it has a flavour essentially its own, the texture may be described as soft and granular, embodying the salient features of a typical Cheshire and Leicester, while to the touch it is rich and buttery; when bored with a "trier" the fatty, smeary appearance on the back of the iron is such as is usually found only in a ripe old mellow cheese.

If the top surface of a mature cheese be gently pressed with the thumb in the manner so well known to those in the trade, a perceptible break in the surface round the edge of the thumb will be noticed, showing the delicate and fragile nature of the texture.

*Accommodation and Utensils.*—Two rooms are necessary, one as the making- and press-room, and another to serve as the ripening-room. A suitable size for the former is 12 ft. square, and for the latter about 7 ft. square. It would be possible to manage with one room only, but the great disadvantage would be that on the windows being opened



at the end of the day's work, cheeses which had previously been made would be chilled and the ripening process affected.

During the night a cheese-making room should, in summer, be fully opened to the air, the atmosphere being sweetened thereby and the temperature lowered.

It is equally important that the room in which the cheeses are ripened should be kept at an even temperature; obviously if one room only be available, the best results cannot well be expected. Each room should be ventilated in a thorough manner, and both ventilators and windows be made to open and close with ease.



PYRAMID OF KINGSTON CHEESES.

Throughout the process of making it is desirable to have the room at a temperature of about 60° F.; if, however, such a temperature can be obtained only by keeping windows, door, and ventilators continually closed, this point must be waived.

A very practical means of securing the required temperature in the ripening-room, at a minimum cost, is to have this room arranged on the other side of the wall from, say, the kitchen fireplace; this is not intended for general application, but in this particular case.

We have found that in order to secure the necessary quick ripening the room must be at a temperature somewhat higher



than is usually the rule; a temperature of 60° F. to 65° F. is satisfactory, and the disadvantages often experienced in ripening larger cheeses at a fairly high temperature have not been met with.

In the making-room, shelves are required for the various smaller utensils, and also, should it be necessary, for one day's cheeses, previously to their being taken from the mould; a table or bench is also needed on which to turn and bandage the cheeses.

In the ripening-room, provision should be made by means of "sparred" shelves for the accommodation of about fourteen days' cheeses, the shelves to be sufficiently wide for one cheese; we have found that by using sparred shelves a much freer circulation of air is obtained, a fact which materially assists in obtaining the desired ripening.

It is immaterial whether the shelves are arranged round the walls or in the centre of the room, provided proper ventilation is obtained.

In addition to the accommodation above noted, a small out-house near at hand would be an advantage, as a boiler or copper could be fixed therein.

A sure supply of hot water is essential, and if no room is available, a portable copper can be bought at a small cost, and can be fixed just outside the dairy or moved about at will.

As regards the utensils, some initial expense is inevitable; it is, of course, possible to make good cheese by the aid of very primitive appliances, but we are strongly of opinion that for the purpose we have in view it is preferable, and in the end much more economical, to obtain as far as possible up-to-date utensils of a suitable and convenient nature.

However careful and systematic the maker may be, it is not an easy matter to produce an article of uniform quality throughout, and as uniformity is one of the essentials to successful dairying, any mechanical assistance to the attainment of this end should be warmly welcomed, even if for the time being some extra expenditure is entailed.

Any of the principal dairy-utensil manufacturers can supply what is required, though the prices given below may vary to some extent.



*Metal Vat*, with wooden rack and suitable stand, sufficiently large to enable the maker to deal with 12 gallons of milk, £2 10s.

*Two Small American Knives*, one vertical and one horizontal, the blades of the former being about  $\frac{3}{8}$  in. apart and the latter  $\frac{1}{2}$  in.; when ordering these the size of the vat should be borne in mind, and the knives be obtained of such width as will ensure them cutting the curd without any "overlapping," so avoiding variation in the size of the pieces of curd.

*Curd Mill*, with double tinned iron rollers, such as used for the grinding of Cheshire curd, £2 15s. In order to maintain the typical nature of the cheese it is necessary that before moulding the curd shall be ground to a very fine state, a condition which cannot well be obtained by breaking with the hands.

*Press*.—Double level single press, sufficient to give  $1\frac{1}{2}$  cwt. pressure dead weight, £2 10s. As the cheeses only require a few hours' pressure, one press is quite sufficient, and will be available for each successive day's make. This appliance we consider is of great importance if the cheese is to be secured true to type; we have tried many methods of pressing, but find that varying weights direct on each cheese singly, are not satisfactory, inasmuch as the cheese dries and fails to form a coat, while instead of ripening quickly, it becomes chalky and tasteless.

*Moulds*.—These are made in well-tinned metal, and a sufficient number should be obtained for two days' make of cheese. The size will, of course, vary according as the cheeses made are approximately 1,  $1\frac{1}{2}$ , or 2 lb. in weight; the following measurements are suitable, where the cheeses are to be about 1 lb. weight, and other moulds should be in respective proportions:—Height 4 in., and diameter  $3\frac{1}{2}$  in., the bottom of the mould being closed except for a hole in the centre  $1\frac{1}{2}$  in. diameter. A loose tin follower is used in the bottom and a wooden follower 1 in. thick is needed to cover the curd at the top.

In addition to the above, there will be required a thermometer, measuring glasses, cheese cloth, bandaging cloth, and the usual supply of buckets, brushes, ladles, scoops, &c.

It is generally understood that in establishing a cheese-making dairy of, say 40 cows, the outlay for utensils averages about £2 per cow. It will be seen that the total outfit we recommend can be obtained for less than £10, thus keeping well within range, even if the cheesemaker has but four or five cows.

*Method of Manufacture*.—In the making of this, as in all cheeses, the first essential is clean, wholesome milk, free from taint, *i.e.* any undesirable odour or flavour, and untreated by chemicals and extremes of heat or cold. The "Kingston" cheese is made from mixed milk, equal parts of the morning's and evening's milking.

The evening's milk having been brought into the dairy properly strained and filtered, is poured into the vat, and by means of cold water in the jacket of the vat the temperature is reduced.



It is well known that taints are due almost entirely to the growth of certain micro-organisms, and further that such taint producers flourish at a fairly high temperature, or at one fairly low. The type of organism required by the cheese-maker is that which produces lactic acid and no taints, and it is therefore necessary to have the milk during the night at such a temperature as will be favourable to these bacteria, rather than to those already mentioned.

The jacket of the vat having been filled with cold water, the milk is gently stirred at intervals in order to equalise the temperature and also to assist in getting rid of that odour, too often present, known as a "cowy" odour.

If the first supply of water is not sufficient, this should be run out and the jacket refilled; care being taken, however, that when the vat is left for the night the water in the jacket is about the same temperature as the milk itself, or the cream will rapidly rise.

A wooden rack is placed over the vat, and covered with clean cheese-cloth or muslin until morning; to use a lid for this purpose is a mistake, as it prevents free access of air.

The following morning the cream is skimmed off, warmed in a pan over a copper, and poured back into the vat with the morning's milk: the slight heating assists in the mixing of the night's cream with the milk.

In the making of any quick ripening hard-pressed cheese, an appreciable amount of acidity must be developed in the milk before the rennet is added. From the practice of adding some agent to "start" the acidity in milk for cheese-making we derive the term "starter," which may be defined as follows:—"A starter is a growth or culture of those bacteria which best bring about the required amount of the right kind of acidity, and also the desired flavour; such culture when once obtained being kept pure."

Except in special circumstances, it is more satisfactory to use a pure or commercial starter. Its propagation and use are matters of great moment, and full particulars and instructions relative to these points are given in a leaflet prepared for the use of farmers and dairymen by one of us (Alec Todd) and issued from the College.

The starter should be strained into the vat through a fine



sieve or muslin when the first morning's milk is added, at the rate of about  $\frac{1}{2}$  per cent. (or approximately  $\frac{1}{2}$  pint to 10-12 gallons).

The temperature of the milk is now raised to 84° F. by means of hot water in the jacket, the milk meanwhile being frequently stirred to mix the starter, and to bring about a uniform temperature.

The cheese may be made either white or coloured; we have usually made the latter, and if this be done the annatto should always be added and well stirred in at least ten minutes before renneting: one dram of annatto to four or five gallons of milk gives a suitable colour, and on being added it should always be diluted with water or milk to insure a more perfect mixing. One of the fundamentals which must be attended to if a uniform quality of cheese is to be assured, is to have practically the same amount of acidity present in the milk each day at the stage when the rennet is added: the most satisfactory method of estimating this is by means of a "Rennet Test," which consists in determining the amount of acidity present according to the length of time taken for a given quantity of rennet to coagulate a given quantity of milk at a definite temperature. The apparatus required includes a measuring glass graduated in fluid ounces, to hold four ounces, a smaller glass measuring one dram, a thermometer, and a stop-watch—or a watch which is clearly marked in seconds.

In making the test, four ounces of well-mixed milk out of the vat are taken, exactly one dram or  $3\frac{1}{2}$  c.cs. rennet are measured into a cup, and three or four short pieces of hay or straw, say  $\frac{1}{4}$  inch long, are put in to act as indicators. The test is always conducted at 84° F., whatever the type of cheese, without regard to the season of the year. A thermometer is placed in the milk, and in order to bring both milk and rennet to the required temperature, a bowl or small tub should be at hand containing water about 90-95° F. The temperature obtained, a thermometer is placed in the rennet cup, the milk poured in, and stirring with the thermometer commences simultaneously; the time by the second hand of the watch is noted. Having stirred for fifteen seconds, the thermometer, which should still register 84° F., is taken out,

and immediately the straws stop the time must be noted. This is the point of coagulation, and the number of seconds elapsing from the time the milk comes in contact with the rennet until the straws stop is taken as the rennet test. We have found that a test of twenty-five seconds is suitable as an average, but the actual test must be decided by individual makers on account of variation in milks and changes of season.

On no account should the milk be renneted before sufficient acid is present, or the process of manufacture will be lengthened to the detriment of the cheese; while, on the other hand, if the renneting be delayed after a suitable test has been obtained, a quick over-acid cheese is the result. When the temperature and rennet test are satisfactory, the rennet is added at the rate of one dram to  $2\frac{1}{2}$  gallons of milk, after having previously diluted it with six times its volume of water to facilitate the mixing with the milk, the whole is thoroughly stirred for five minutes, and then the surface of the milk gently stirred until the rennet shows effect. If the operation is continued beyond this stage the milk is "over-stirred," with consequent loss of fat and deterioration of quality in the cheese.

The vat is covered with a lid and the contents left until set or until coagulation is complete: this should be about forty to forty-five minutes from the time the rennet was added.

When sufficiently firm, a state at which the coagulum should break clean over the finger, cutting takes place. This is accomplished by cutting lengthwise and across with the vertical knife, and lengthwise with the horizontal knife, thus leaving the sections of curd about half an inch by a quarter of an inch. The operation must be most carefully carried out, as an even cutting enables the maker to scald evenly, and also assists considerably in a uniform expulsion of the whey. If an acidimeter be used the acid test at this stage should be '12 to '13 per cent. The advantages of including this apparatus, which is inexpensive, in the fitting up of a dairy are many, and the writers will be very glad to supply to any reader on application full information relating to its uses. After cutting, the curd remaining on the bottom and sides of the vat is loosened, and the whole gently stirred for ten to



fifteen minutes in order to separate the pieces of curd; at the same time a thin film forms around each particle, thus preventing to a great extent loss of fat.

The process of scalding, cooking, or heating then commences, which consists in gradually bringing the contents of the vat uniformly to a suitable temperature, that most satisfactory being 88° to 90° F. Hot water is poured into the jacket of the vat, and the stirring carefully continued as before. Renewal of the water is necessary, and the final temperature should be attained in twenty minutes.

The objects of the heating are:—

1. To firm-up the curd.
2. To expel the moisture gradually and uniformly.
3. To assist in the development of acidity.

When the "scald" temperature is reached, stirring is continued until a suitable firmness is obtained, when the curd is ready to pitch, that is, to be allowed to settle at the bottom of the vat. This is a condition almost impossible to appreciate except by practical demonstration and experience, but usually the time taken from commencing to stir until pitching is  $1\frac{1}{4}$  to  $1\frac{1}{2}$  hours; the curd should not be mushy, while if a particle be split it should be of an even consistency and no free whey apparent. A period of twenty to thirty minutes is sufficient for the curd to lie in the whey, but before running off the latter a test should be made on a hot iron, and if convenient, with the acidimeter.

To perform the hot-iron test a little curd is squeezed in the hand until sufficiently pressed to hold firmly together and then applied to an iron—a plain file is suitable—heated to a black heat, in such a manner that if there is acidity in the curd, it—the curd—will draw away in fine silky threads. If the threads on the iron are one-eighth of an inch long the whey is drawn; at the same stage some whey squeezed from the curd and tested with the acidimeter shows 15–16 per cent. acidity.

The drawing of the whey is one of the most important stages in the whole process of making, and it is essential that there should be the right degree of acidity present; if not sufficient, the curd will be soft and retain too much moisture, resulting in a "sweet" or "weak" cheese. If too much

acidity is present, an "over-acid" curd will be obtained, producing a hard, dry cheese.

In commencing this operation the curd is drawn up to the end of the vat away from the tap, and slight pressure applied to assist in the expulsion of the whey. When this is complete the pressure is taken off and the curd cut into four-inch cubes, and taken out into a cloth on a rack, each cube of curd being turned in so doing.

The rack is placed back in the vat, the curd covered up well with cloths, and left for fifteen minutes. Again, the curd is cut into similar cubes, turned in bulk, and each cube broken into halves; this assists materially in getting rid of the whey, and has considerable influence on the short texture so much required in the final product. It is again covered up and left for an interval of fifteen to twenty minutes. During this time the acidity is gradually developing, and this of itself assists in the draining of the whey. The secret of success in the management of the curd after the drawing of the whey consists largely in the ability of the maker to control the moisture content. The expulsion of the whey and the development of acidity must proceed hand in hand as each acts and re-acts upon the other. The turning and breaking are usually practised two or three times, but this is dependent upon the general condition of the curd as regards dryness and acidity. When ready for grinding, a stage which is generally reached one hour after the drawing of the whey, the test on the hot iron should be three-quarters of an inch, the condition of the curd at this point being soft and velvety to the touch, while it should break short rather than have any tendency to toughness. It is ground to a fine state, and on pressing a handful of curd it should be moist, mellow, and free, with a smaller amount of excess moisture than a Derby, yet more than is required in a Cheddar cheese. Salt is added at the rate of 1 oz. to 3 lb. of curd, and moulding is done at once: the weight of curd obtained will vary according to the season, the average yield being  $1\frac{1}{4}$  to  $1\frac{1}{2}$  lb. per gallon of milk. When the moulds are quite filled they are put under the press, the acidity from press tested with the acidimeter showing '5 to '6 per cent.

The cheeses are left for two hours, just the dead weight of



the press being applied, when they are turned, and pressed again for a further period of two hours; the pressure is then taken off, the cheeses turned again, and left to stand on the shelf during the night. During the following day the cheeses are allowed to remain in the moulds, and a slight greasiness appears on the coat. On the morning of the second day the coats are scraped with a knife until smooth, then bandaged, using calico and paste: it is an advantage to allow the bandage to come well over the edges in order to preserve them from cracking. After remaining about a day for the bandage to dry a little, the cheeses are removed to the ripening-room, where they must be turned daily. In ten days' time they should be ready for sale, and on stripping off the calico a smooth clean surface is found, while the ends of the cheese not covered with the bandage will be nicely coated with mould. In consideration of the fact that the cheeses are small and consequently much surface is exposed to the air, the percentage of loss in weight is small, one gallon of milk producing slightly more than 1 lb. of ripe cheese. If for retail trade, the cheeses should be offered for sale in a manner pleasing to the eye, and wrapping in tin-foil is to be recommended.

## PROGRESS OF THE SUGAR BEET INDUSTRY IN NORFOLK.

WALTER E. SAWYER.

This year all our interests are centred in the endeavour, which is being made by Mr. E. S. Ali Cohen, with the assistance of the Norfolk Chamber of Agriculture, and of many farmers and landowners, to make this year's trial a success that will justify the erection of a sugar beet factory in Norfolk. The trials made last year in Norfolk on a small scale conclusively proved that we could grow sugar beet of good sugar content and in sufficient quantity to make it profitable, and suggested that it was only necessary to do the same thing on a larger scale to turn the experiments to commercial account. Several hundred acres are being grown this year in plots of varying size up to 25 acres, and by overcoming difficulties gradually, we hope to be in a position another year to contract for a much increased area. It is

necessary, however, to proceed slowly, so as not to put too much strain on the labour question without due preparation.

The terms offered by Mr. Cohen for this year are understood to be approximately as follow :—

(1) A guarantee of £3 per acre net profit, if the land be approved after inspection by experts.

(2) Cultivation expenses not to exceed a total of £9 per acre. Seed supplied and drilled free.

(3) Expert supervision, instruction, and assistance provided during growing and harvesting.

(4) Produce accepted this year at 18s. 6d. per ton net,\* free on rail, wharf, or quay, pending the erection of a factory in this county.

(5) Contracts offered for years 1912, 1913, 1914 at £1 1s. 6d. at factory, or accepted on rail same price minus carriage to factory.

(6) Dried sugar pulp guaranteed to contain 30 per cent. sugar at a price not to exceed £6 10s. per ton at factory, and growers this year to have it supplied them, imported, at the same price free on rail Harwich.

*Directions for Cultivation.*—The land has now all been inspected, and a few cultural directions have been issued, both for this year and for future years, as the contracts have come in very well for 1912-13-14.

The general recommendations are :—The land to be manured in the case of heavy or light clay soil in October, November, and December with farmyard manure at a rate not exceeding 30 tons per acre. In the case of light and sandy soils the manure is to be applied in March, preferably a fortnight or so before sowing the seed. In both cases the manure is to be ploughed in to a depth of 12 or 13 inches.

The land, if clean, will then only require harrowing and getting to a fine tilth, and rolling down is necessary; if at all foul, it must, however, be thoroughly cleaned. Then it is to be drilled, after which the light harrows follow, and it is left rolled down.

As soon as the young plants appear in the rows the weeder

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\* The net weight will be fixed by taking a sample of half-a-cwt. out of a lot of six tons, which sample will be cleaned. The difference ascertained by such cleaning will be considered as tare, and calculated per ton. The average tare will be deducted over the whole lot offered for delivery.



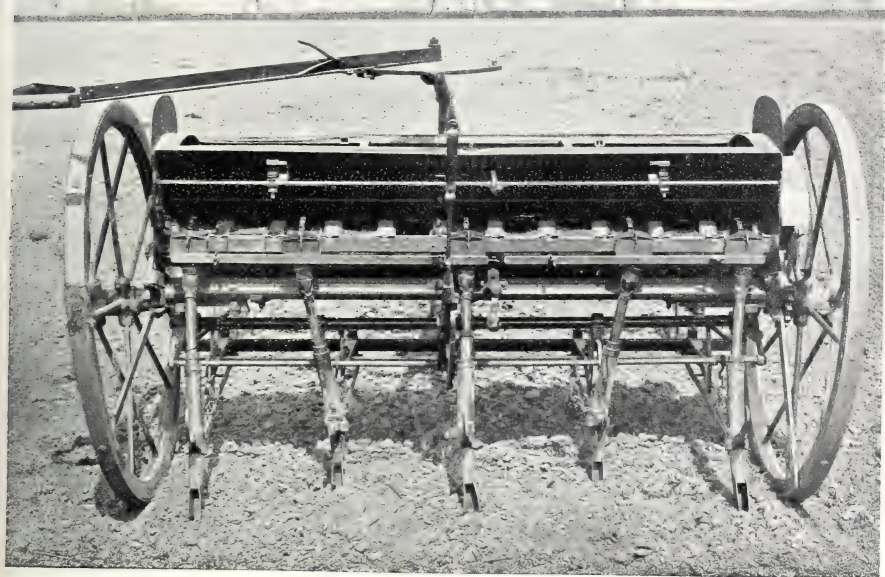


FIG. 1.—DUTCH DRILL. (Back view.)



FIG. 2.—DUTCH DRILL. (Front view.)





or horse-hoe must be got to work, and at that time a top-dressing of nitrate of soda, 15 per cent. nitrogen, about 1 cwt. per acre, is to be given. The rows will be plainly visible in a favourable season in twenty-one days.\*

About a fortnight later, the plants being strong enough, the cutting-out is to commence, and that is done by crossing the drilling with the imported horse hoe, and then the final singling is done by hand-picking. The plants then will be either 13 inches or 14 inches from row to row, and singled to about 13 inches apart. A second dressing of 1 cwt. nitrate of soda is then recommended.

The crop must afterwards be kept clean by constant horse-hoeing as long as possible, as well as by hand-hoeing. By about July the leaves should cover the land, and so render further work impossible.

*Drilling.*—We have had the use of three imported Dutch drills, two of which drilled the seed ("Kleinwanzlebener") 14 inches, and one 13 inches from row to row, at the rate of 16 lb. per acre, quite shallow, not more than  $\frac{3}{4}$  in. to 1 in. deep, all on the flat. They are a novelty to us as regards construction, but are the general-purpose drill, as used generally in Holland, and are capable when all the seed coulters are in work of drilling 11 rows at a time.

They have a front steerage operated by a lever at the back, so that it is possible for one man to drive the horse and attend to the drilling at the same time, and an expert can cover about 12 acres per day. The attachment for the horse is such that it gives great liberty, and it is not necessary for the horse to walk particularly straight; in fact, so long as he keeps in the right direction, it allows the drilling to be done to a nicety and compare favourably with that done with a back-steerage drill. The drill is put in and out of work by a lever in a very similar manner to an American drill.

*Hoeing.*—As we have had excellent weather, the beets have germinated very quickly, and at the end of May horse-hoeing was in full swing, the plants showing well with four leaves.

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\* This year seed was drilled on April 19th, 20th, 21st, and horse machines started on May 24th, 25th; so that the interval was more than 21 days.

There are three imported horse-weeding or hoeing machines at work here now. They are in many details as unique as the drills. They work with four large  $\Lambda$  hoes,  $9\frac{3}{4}$  in. for the middle four rows and two smaller  $\Lambda$  hoes  $7\frac{1}{4}$  in., which take part of the outside row, and return in the same row on going down a field as coming up, thus taking five rows at a time. The horse walks *on* or *straddles* over the middle row, and it is said the damage done is infinitesimal. Certainly when quite small the plants do not appear to get damaged; what will happen later remains to be seen.

The hoe itself is governed by a rack and pinion steerage, operated from the back by a steerage post and two handles, and in use the operator only has to keep the middle row in exact line with his steerage post, and all is well. When the plants are quite small, to prevent the hoes crowding the mould over them and smothering them completely there is an ingenious attachment of revolving discs which fit on the shanks of the hoes and run on each side of the tiny plants, and act as guards, thus allowing hoeing to commence quite early. When the land is reasonably fine they are of great use. Unfortunately, this year the land, especially on heavier soils, is inclined to be rough. The machine is quite lightly made, and one horse harnessed by traces attached to the collar can work the five rows comfortably.

*Manuring.*—Most of the lands growing sugar beet were manured in the autumn with farmyard manure, though some were done in the spring.

As regards the artificial manures on the various lands the four following are being used (per acre in each case):—

(1) 3 cwt. compound manure containing 7 per cent. ammonia and 9 per cent. phosphate.

(2) 3 cwt. superphosphate, 1 cwt. sulphate of ammonia, and 1 cwt. sulphate of potash.

(3) 4 cwt. compound manure, containing 35 per cent. phosphate,  $2\frac{1}{2}$  per cent. ammonia, and  $2\frac{1}{2}$  per cent. potash.

(4) 2 cwt. sulphate of ammonia.

There is still some prejudice against the crop, as some say it is exhausting. This is not, I think, borne out by facts, but after this year we shall have our own results to go by,



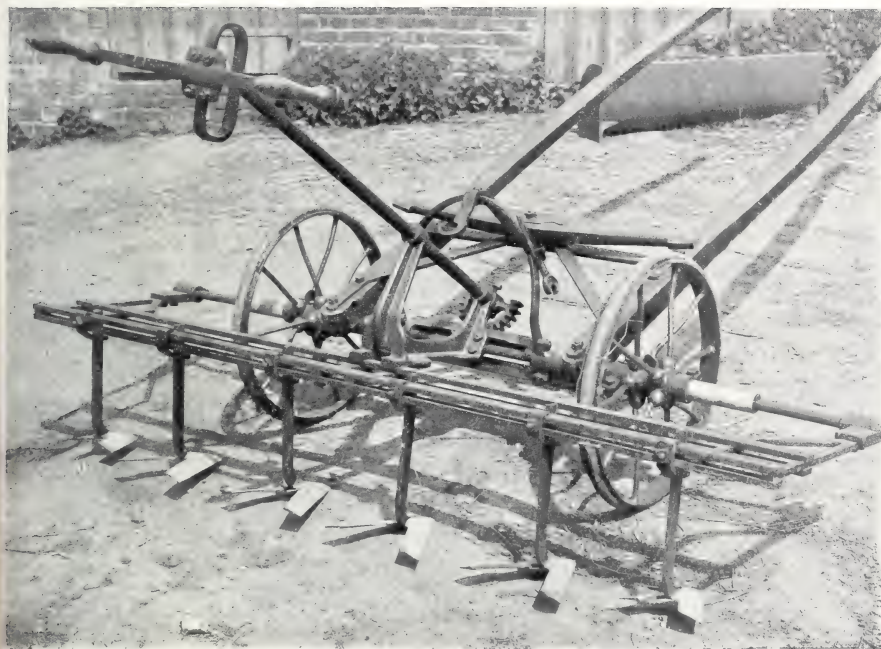


FIG. 3.—DUTCH HORSE-HOE OR WEEDER.

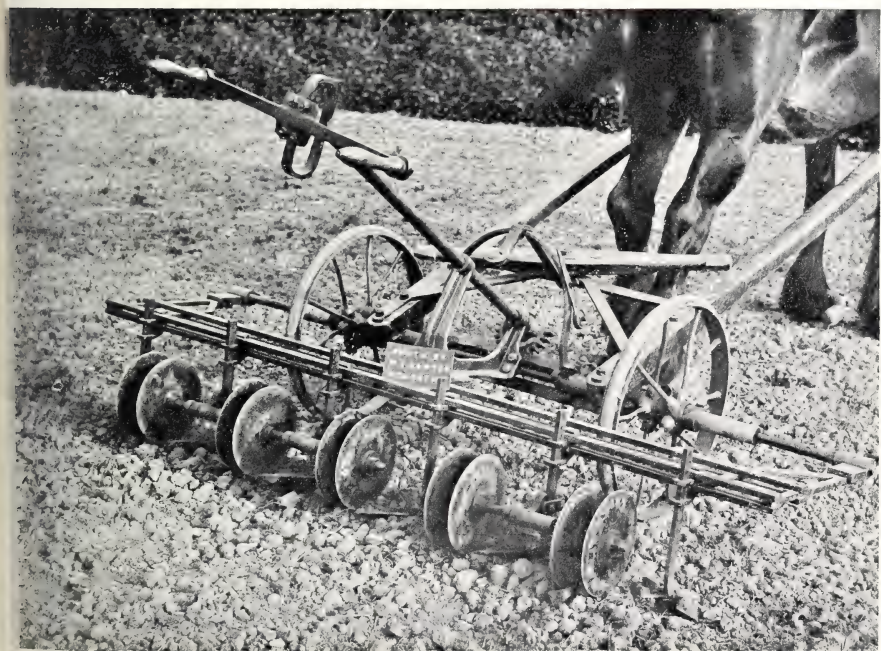


FIG. 4.—DUTCH HORSE-HOE WITH DISCS.





as last year's sugar-beet ground will provide evidence on this point.

For the Royal Show held at Norwich this year we are promised some results and practical demonstrations of pulp feeding *versus* ordinary food, such as is used generally in the county in the same way. It is also hoped that addresses will be given with regard to the industry.

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## PLANTING, CLEANING, AND CUTTING WILLOWS.

W. PAULGRAVE ELLMORE and THOMAS OKEY.

THE previous article \* on Osier and Willow Cultivation dealt with the preparation of the ground, the supply of labour, and some other local conditions which must be taken into account in farming a plantation. The next point to be considered is the method of planting.

The late Mr. William Scaling recommended an appliance consisting of an oblong frame with two centre bars, one end and side having iron guides attached to denote the correct distance from the last sets; two men were needed to work it and were able to insert four rows simultaneously. Notches were cut in the outer frame and the inner bars to indicate the places for the planting of the sets, which were carried in four boxes, two being fixed on each end of the frame. The result, however, was not satisfactory, as it was difficult to keep the lines perfectly straight, and, in addition, the frame became very heavy to move about on account of the accumulation of soil upon it.

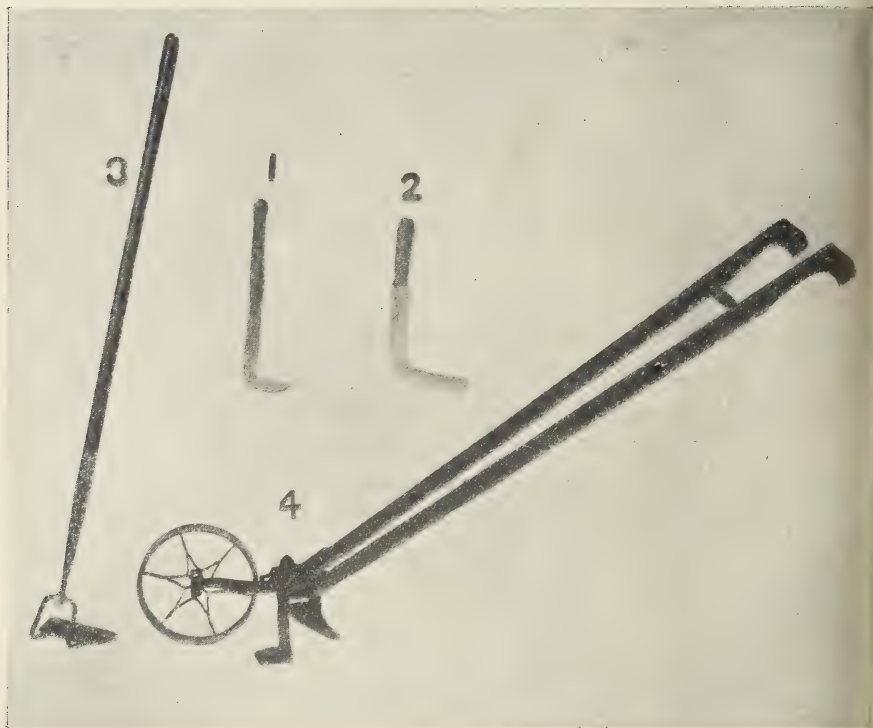
The more general method is to use an Italian hemp cord, of three ply, with strips of linen passed between the strands of the cord at regular intervals as indicators for the sets. This works better, but often throws the sets out of their true distances, because in the length adopted (40 yards) the cord varies according to the dryness or humidity of the atmosphere. This method, however, will probably be found as useful as any other in the case of a small area, where it would

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\* *Journal*, April 1911, p. 12.

scarcely be worth while to go to the expense of a suitable planting chain.

A still less expensive way is to use any kind of cord and cut a stick equal in length to the distance between the plants, using that to show the distances at which to insert the sets. To overcome the difficulty created by a shortening or lengthening of the cord, Mr. Ellmore, for many years, has used a planting chain, somewhat similar to those employed by



HOES AND KNIVES USED IN CONNECTION WITH WILLOW GROWING.

1 and 2, Cutting-hooks or Knives; 3 and 4, Hoes.

land surveyors, but made in a less costly manner, with one-inch rings inserted at equal distances as guides for the planter. Every third link should be fitted with a swivel, to prevent the twisting or linking up of the chain. This produces perfect work provided a guide square is used for the purpose of first setting out the ground, which should be squared from one side and end so as to throw as many as possible of the pikings to the other side and end.

It is customary for willow growers, alike in Great Britain,



France, Belgium, Germany, and Holland, to plant closer in the rows than between the rows, though the reason for this is not known. Mr. Ellmore's plan is to plant always in squares, *i.e.*, at equal distances between heads and rows, but varying according to the natural growth of each particular variety. "Square planting" is a decided advantage as it enables the cleaning to be done by the horse hoe for the first few years. The hoe can be used in two directions, which, of course, cannot be done if the distances are less between the heads than the rows. The proper ripening and hardening of the wood also is dependent on the action of the sun, and this system gives sunlight free access to the head in the growing period. It also stimulates the growth, since the roots have an equal quantity of soil all round from which to draw their support.

*Age of Plants.*—A diversity of opinion prevails as to whether the sets should be cut from one- or two-year-old rods. Some growers prefer one-year-old, believing that they throw off more shoots the first season than two-year-old sets. This belief may have some foundation, especially if the two-year-old sets are cut from the butts of a badly-grown two-year-old crop, which is often the case with inexperienced or careless growers. The practice recommended, however, is to leave the best-grown and healthiest one-year-old rods for two years' growth, having first cut out all the smaller growths, so as to afford the greatest amount of support possible for those left on the head, and, in our experience, this method gives the best financial result. From such rods six or seven sets can be cut, and it is obvious that healthy plants will give a better crop than cuttings from dwarfed or badly-grown rods. When, however, only two or three sets are taken from the rod, and this is a very common practice, the argument in favour of the younger or one-year-old rod holds good.

The third and higher sets cut from a two-year-old plant throw out more shoots than the sets cut close to the butt end, where the wood is harder and the eyes are consequently less active, but, on the other hand, there is always a great risk in using one-year-old sets, owing to their thinner size and less resistant calibre. Under the influence of dry winds and an absence of showers in the months of April and May

they will very often die or sicken, whilst two-year-old sets, being much stouter and their bark far thicker, will withstand the dry time more successfully.

Twelve inches is the best length to cut the sets. They must be cut on the slant for inserting in the ground; but the end which is to remain out of the ground should be cut nearly straight and just above an eye. With this extra care very few sets will show any dead wood, and a nicely-shaped head will be the result. The cutting of the sets must be performed with a sharp knife, so as not to bruise the bark or wood. They must be buried so that about one inch is left exposed above the surface, and the eyes must always point upwards. The land, being freshly broken up, will subside a little during the summer, leaving the head something like two inches out of the ground. If the sets are cut longer the extra length is wasted, because the roots seldom strike more than ten inches below the surface, whilst if the sets are left higher out of the ground the crop—after the close of the growing season—will be needlessly exposed to the winter winds, which have great force, and sway the heads to such an extent that they are often loosened, and consequently die through the admission of frost and water. Particularly is this the case with the first, or maiden, crop, on account of the small root growth. The closer the head or stool is to the ground the greater resistance it can offer to the action of storms. Many French growers have been used to plant sets at an angle of 45 degrees on the supposition that they thus root more freely. This we believe to be an error, and indeed it is now being discarded in favour of vertical planting.

Growers should always plant more than one sort, because seasons vary greatly, and whilst one may do well generally, it often happens that another will do far better. It is indispensable that every species or variety be planted true to its kind. We cannot be too emphatic on this point, because when sold green for buffing different kinds produce marked contrasts in colour, even when the treatment is identical, and when this is the case the market for high-class manufactured goods is either lost or a much lower price realised. Nothing from the standpoint of the skilled worker is worse than to see several shades of material in his product. The



importance of this consideration when the willows are intended for white is not less, owing to the great variation in the time during which the sap rises, and owing to which the early sorts peel well and the backward sorts require to be scraped to remove the bark from the butt ends. This again greatly reduces the market value. By planting several sorts the requirements of the all-round trade will be met, and the longest time possible be gained for harvesting the crop. Between the earliest and the latest sorts there is sometimes a period of three weeks.

Whether any practical result is to be obtained from experiments with sexual difference in willows is extremely doubtful, although it opens up a field for botanical and scientific research. We have not, in our experience, discovered any marked difference between the crop from the stool of the staminate form and that of the pistillate form. Consequently it may be regarded as a matter of indifference from the standpoint of the bulk or quality of material produced whether one or the other, or both, are planted indiscriminately.

*Cleaning.*—The ground being now planted it is most essential that all weeds should be kept down by hoeing. In the case of maiden crops hoeing right up to August 1st is resorted to, in order to maintain the surface of the soil in a loose condition. If this is allowed to bake or crack many heads will be found dead the following spring, and the grower will be fortunate if failure to keep the top soil open does not bring a blight on the crop. It should be remembered that a heavy strain is imposed on the plants, which are endeavouring to develop simultaneously a shoot growth above ground, and a root growth below. For lack of sufficient hoeing during the first year we have seen many acres destroyed by green fly and honey dew, especially if the spring had proved to be a dry one; and this has not only resulted in a year's loss of growth, but also necessitated planting again the following season. In the case of older heads the hoeing ought not to be discontinued whilst the men can move freely in the crop, which they generally can do up to the middle of June. By that time the willows begin to make such rapid growth that they smother all the undergrowth, and only in the outside rows will any further attention be required.

Several methods are adopted for keeping the land clean. One found most suitable in Leicestershire is the employment of a three-tined horse hoe with an arrow-shaped blade on the front and two inward blades in the rear. This can only be used if great care is exercised to prevent barking the head by striking it with the hoe, thereby occasioning considerable exhaustion of the plant, and consequently a defective crop. Moreover, this hoe can only be brought into play for the first year or two, whilst the heads are sufficiently small, and the spaces allow a pony or small horse to travel between the rows. A swan-necked hoe will usually be found the best tool for this purpose.

*Cutting.*—The termination of the growth and the ripening of the wood will be determined better by the fall of the leaf than by the calendar. This stage varies in England from the end of October to the middle of November. When the leaf has nearly all fallen the rods are ready for cutting, but it is not advisable to commence cutting at this early period except for the purpose of buffing, which operation should be begun on the earliest possible date, in order to take full advantage of the short mild season before Christmas.

It will be found profitable to leave a portion of the one-year-old crop standing for two-year-olds. This undoubtedly gives the heads a rest, and the succeeding crop of one-year-olds will be found taller and heavier than that from the heads which have been cut each year. About every fifth or sixth year is recommended for this rule to be carried out. Another good practice is to cut out with a sharp knife or fine shears all the smaller or rough growths. This will amply repay the grower for the labour expended, for, if left on the heads, these worthless growths will draw a certain amount of vitality from them, and ultimately get smothered by the more vigorous rods, and need to be sorted out when cut. There is always a very active and profitable demand for well-grown two-year-old rods of good quality, either as buff or white, for manufacturing strong hampers, such as are largely used in the hosiery-making districts, as well as in Yorkshire and Lancashire. These two-year-olds are required for what are called staking, or lid and bottom sticks, around which the one-year-old rods are worked.



Cutting is usually done by men with the kind of knives illustrated, both of which are excellent tools. In no circumstances must this part of the work be performed in a slipshod or careless manner. The knife must be inserted on the outer side of the rods, and cut inwards and upwards, and quite close to the head, with a sharp and clear cut, free from split wood or torn bark. When the cutters are careless many small spurs will remain on the head, and since these spurs form the butt end of the rod, much material is sacrificed, and since the crop is sold by weight a needless financial loss is the result. Moreover, these spurs invariably die off during the next growing season, dead wood accumulates, and still further and longer spurs are left when cutting time again comes round, until in the course of a few years the head, which should at no period be larger than a fair-sized orange, is frequently found as big as a cabbage. Round this accumulate moss and various fungoid growths, and the bearing capacity of the head is reduced in some instances quite 50 per cent. When some of the spurs live, as frequently happens, they throw off many small and half-developed rods, tending to the earlier exhaustion of the head. Cutting the maiden crop, over which too much care cannot be shown, and on which the future compact head-formation depends, should be done by day workers. Afterwards cutting is invariably done on piece-work terms, from 2s. 3d. to 2s. 6d. being the average price for twenty bundles, each a yard, or in some counties, 42 inches in girth, the band being tight and fixed 10 inches from the butt. Another common way of letting by the piece is to pay 6s. 6d. to 7s. 6d. per ton for a one-year-old crop, including the carrying of the bundles to various points for collection by the carters. The prices vary according to the sizes of the rods, the larger varieties being the cheaper. In this manner all dispute as to whether the bundles are tied up tightly or loosely is obviated.

A willow ground cultivated as directed will last about twenty years in a full-bearing condition, and still be a profitable source of income for ten years longer. All sickly heads should be removed each winter, and the vacant places filled by a well-grown one-year-old of entire length, or a tall-grown two-year-old cut off at the start of the two-years' growth. A

still better method is to set apart a small plot of ground and grow yearly a sufficient number of each variety for transplanting, in which case the cuttings may be set 12 ins. square. The tap root and also the longest and weakest of the fibres should be shortened a little with a sharp knife, care being taken to leave no ragged wounds to bleed when active growth should be in progress. Only one shoot, the longest and strongest, should be left on the head. A healthy transplanted maiden head will never fail to establish itself. In this way the life may be prolonged, as in the case of a 16-acre field at Wanlip, near Leicester, which, although planted over twenty-five years ago, cut from six to eight tons of one-year-old green to the acre, which realised £5 per ton in January, 1911.

### THE ALDER AND OSIER WEEVIL (*Cryptorhynchus lapathi*, L.).

R. STEWART MACDOUGALL, M.A., D.Sc.

*C. lapathi* chiefly attacks and uses as brood places alder and willow, while it also occasionally and exceptionally infests birch and poplar. This weevil is found in England, where locally it may be common; it is not common in Scotland.

*Alnus glutinosa*, Gartn., and *Alnus incana*, Willd., are both infested, and attacks on Alpine Alder (*Alnus viridis*, Dec.) have been recorded in the Continental literature. Among Willows, *Salix caprea*, *S. viminalis*, *S. purpurea*, and *S. triandra* are host plants.

The Alder and Willow Weevil is destructive, both as adult and as grub. Branches of alder, two years old and some years older, are freely attacked, but poles of thirty years and more do not escape. In the willow, young shoot and branch and stem are attacked; where in cultivation the willow shoots are cut annually, the main stem is used as a place for the brood.

The damage is both technical and physiological; wood tunnelled by the larva is spoiled, while branches that have been attacked, but persist, are deformed.

There is loss and destruction in various ways:—

(1) The grub eats out a space below the bark, spoiling both bast and cambium.



(2) The grub gnaws a gallery in the wood. Tunnelled branches break across, and are blown down by the wind.

(3) The adult punctures the bark, and gnaws the bark of branches right into the cambium. Such wounds afford suitable places of entry for the spores of some injurious fungi that are wound parasites.

(4) The tips of shoots are eaten so that the shoots bend over, fail to elongate, and die.

(5) The bark undermined and tunnelled by the larvæ dies, sinks in, and ultimately crumbles, exposing the sapwood.

*Symptoms of Attack.*—(1) The yellowing of the leaves, and the gradual withering of the shoot.

(2) The change in colour of the bark just above the feeding place of the young larva.

(3) The sawdust that is sent out from the larval gallery. This sawdust and the thread-like spales of wood, from the gnawing of the larva, may remain on the outside of the bark round and below the external bore-hole, sticking together in a clump; this material may also fall to the ground below.

(4) The canker-like places on the outside that result from larval attack.

(5) The round flight holes of the adult beetles.

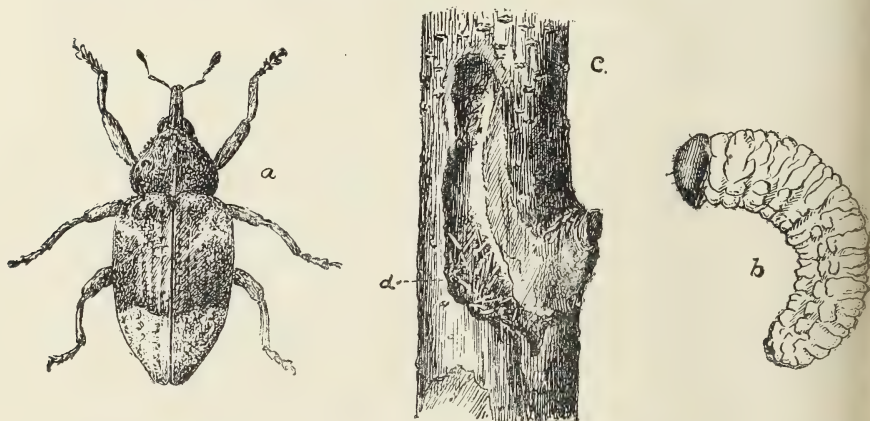
*Description.*—*Adult:* The beetle measures about  $\frac{1}{8}$  inch in length; it is dull black or black-brown in colour; the prothorax, the sides of the thorax, the hind third of the wing-covers, and the thighs are more or less thickly covered with chalk-white or yellow-white, or sometimes reddish-white scales; the antennæ are reddish, and clubbed at the apex; the rostrum or proboscis is well marked, but when the beetle is at rest the proboscis cannot be seen well from the upper surface owing to its being bent under the thorax; the wing-covers (examined with a lens) show a series of longitudinal lines and punctures, and erect tufts of black scales. The base of the wing-covers is square, but the apex is narrowed.

*Larva:* The larva is a legless grub with a whitish body and brown head and mouth parts.

*Pupa:* The pupa is yellowish-white, and lies in the larval gallery, with bent proboscis.

*Life History.*—The adult beetles are found from May onwards during the summer. The female lays her eggs

on or in the bark. The larva, on hatching, feeds first just below the outside bark (in thick material the larva may go at once towards the wood); the bark lying over this place of eating changes colour. Later this grub bores into the wood, and after the gallery has been bored for a short distance it takes an upward bend and runs longitudinally in the wood for 4 or 5 inches or more. In thin material the gallery may go right to the pith, but not so far in thicker stems. The larval galleries are round in transverse section, and are more or less filled with saw-dust and wood



ALDER AND OSIER WEEVIL (*Cryptorhynchus lapathi*, L.)

a. Weevil,  $\times 4$ ; b. Larva,  $\times 4$ ; c. Tunnelled wood, showing "frass" at d,  $\times 2$ .

chips which may be seen on the outside projecting from a hole gnawed by the grub in the thin superficial bark at or beside the original entrance hole. The full-grown larva becomes a pupa at the end of the larval boring, and the beetle, on being ready, bites a round hole through the bark for its exit.

There is considerable difference of opinion as to the length of the generation, and whether it be a yearly or a two-yearly one. A one-year generation is the view most favoured. I have at present experimental material of alder under observation which perhaps will help to settle the question, and am of opinion that *C. lapathi*, just as in Nusslin's experiments and my own with the allied *Pissodes* species, has a long egg-laying period, and that there can be an over-lapping of generations according to the time of laying of the egg—May-



June-July-August, complicated by the onset of winter. Thus the winter can be passed as adult or as larva. It is not certain either that young beetles issuing for the first time in autumn are sufficiently ripe for egg-laying before hibernation. The favourite place for hibernation with the imago ready in autumn is the larval tunnel.

*Treatment.*—While willow is a host plant, as is shown by the fact that complaints have been sent to the Board of attacks on willow, alder is very willingly or preferably used for brood purposes, and hence planting alders here and there in willow plantations might serve as a useful preventive measure against attack on willows; the alders would then serve as traps.

There should be timely cutting away and burning of infested branches or stems.

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### THE COMPOSITION AND PROPERTIES OF CONCENTRATED FEEDING-STUFFS.\*

In making purchases of cakes and other feeding-stuffs, a farmer often experiences a difficulty in arriving at a conclusion as to what material to buy, or which particular brand of cake to select.

It is clear that cost per ton is by no means the only factor that should influence his choice, but he is frequently uncertain as to precisely what other considerations should be taken into account, and what degree of importance should be attached to them.

It is the object of this article to furnish a guide to the farmer in the purchase of foodstuffs. Information as to the compounding of rations for farm stock is given in Leaflet No. 79.

The first essential for the intelligent purchase of foodstuffs is that the farmer shall have a clear understanding of the nature and composition of foods, what functions in the animal the different ingredients perform, and the requirements and limitations of different classes of live-stock. *With* this knowledge it is possible to ascertain precisely in what respects

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\* This article is now issued as a revised edition of Leaflet No. 74. Though some portions of the earlier edition of the Leaflet have been retained, the bulk of this article has been written by Dr. Charles Crowther, of The University, Leeds.

and to what extent home-grown foods are deficient, and to purchase only such foodstuffs as can supply the deficiency to the best advantage. *Without* this knowledge one may be misled into purchasing materials which, though excellent enough in all general respects, are unsuitable and wasteful for special purposes. It should be understood, for example, that if decorticated cotton cake or soy bean cake is suitable for a given purpose, certain other foods (*e.g.*, maize, locust beans) cannot alone supply the requirements efficiently; that a milking cow requires a ration of very different composition from that which is most suitable for a fattening bullock (*vide* Leaflet No. 79); and that the use of certain foodstuffs (*e.g.*, undecorticated cotton cake) is attended with an element of risk, especially in the case of young animals.

Armed with knowledge of this character, the farmer, in estimating the relative merits of the different feeding-stuffs to which his attention is directed, should first of all obtain representative samples and submit them to careful inspection, using a magnifying glass for the purpose if possible. He may thus be able to detect any gross adulteration (weed seeds, dirt, &c.), and satisfy himself as to the palatability, freshness, hardness (if a cake), and other outward characteristics of each material.

Assuming that the foods are practically of equal value in these respects, the next proceeding should be to consider their suitability for the class of stock for which they are intended. (Information on this subject will be found in Leaflet No. 79.)

By this preliminary process of selection the unsuitable foods will be eliminated, and it will remain to ascertain which of the suitable foods it is most satisfactory and economical to purchase. This will be determined as regards a given feeding-stuff:—

a. By its composition, digestibility, and “productive value.”

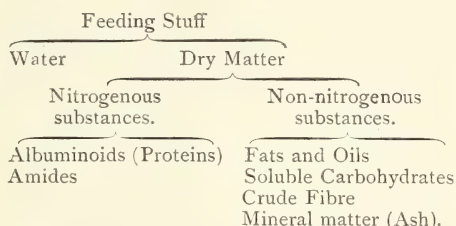
b. By its content of manurial ingredients.

The general significance of these factors is obvious, but it is necessary to indicate how they are taken into account in comparing the values of foods.



### *General Composition of Foods.*

The component parts of all foods, whether home-grown or purchased, may be classed as follows:—



Commencing from the top, it will be seen that feeding-stuffs are primarily made up of water and dry matter, and that the latter consists of nitrogenous and non-nitrogenous constituents, which, again, may be sub-divided—the nitrogenous into albuminoids and amides, the non-nitrogenous into fats, carbohydrates, fibre, and mineral matter.

*Albuminoids.*—The albuminoids (or proteins) form a large and complex class of compounds. They are the true flesh, lean meat or muscle formers, and are sometimes termed the “essential” or “indispensable” food ingredients, because without them life could not be maintained. They contain nitrogen to the extent of about 16 per cent., which, together with part of the carbon, hydrogen, and oxygen, is utilised for the construction and repair of animal tissue; while the rest of their carbon and hydrogen, by combustion in the body, is utilised to maintain the heat of the animal and to supply energy or mechanical force. Beyond this, the albuminoids, if used in excessive quantity, may contribute to the production of fat, or, at least, may protect the fat stored up in the tissues from consumption. Only a relatively small proportion of the excess can be used in this way, however, and the rest is merely burnt up, and has no more value than an equal amount of carbohydrates, which are much cheaper. Many farmers supply their animals with unnecessarily large quantities of albuminoids, and thereby not only make their feeding unduly expensive, but in some cases may seriously affect the general welfare of their stock.

There is not yet sufficient reliable evidence to permit a definite statement as to the relative feeding values of the

albuminoids contained in different foodstuffs. There is some reason to believe, however, that marked differences may occur when individual foodstuffs are fed separately, but that these differences will tend to disappear when the foodstuffs, as commonly happens, are blended together in a mixed ration.

Of the foodstuffs commonly used in this country the richest in albuminoids are soy bean meals and cakes and decorticated cotton-seed meals and cakes, these containing usually upwards of 40 per cent. of albuminoids. Next in order of richness come soy beans (35-37 per cent.) and linseed cake and meal (28-32 per cent.), whilst beans, peas, dried grains, and malt dust all contain 20 per cent. or more.

*Amides.*—The amides, although containing nitrogen, are greatly inferior in feeding value to albuminoids. According to the evidence now available, they seem to have little or no direct value for the production of lean flesh or fat in the case of horses and pigs. In the case of ruminant animals (cattle, sheep, goats), however, certain amides or mixtures of amides can, to some extent, perform this function of albuminoids. In no case, however, has it been found possible to replace the albuminoids of the food completely by amides.

In all animals amides act as heat-producers, and therefore in this respect serve the same purpose in the body as the carbohydrates. In heat-producing capacity, however, the amides, weight for weight, possess only about half the value of carbohydrates.

Amides occur chiefly in immature or watery foods, such as young grass and roots; they are present in trifling quantities only in cereal grains, oil cakes, and other concentrated feeding-stuffs, with the exception of malt culms and molasses, so that, in the present connection, they may be left out of consideration.

*Soluble Carbohydrates.*—The most important soluble carbohydrates are starch, sugar, and mucilage. Carbohydrates abound in all foods and comprise the bulk of the feeding material in cereal grains, locust beans, molasses, hay, straw, and roots. In these foods they must be looked upon as the chief ingredients of value. In oil cakes, pulse grains, dried grains, and malt dust, on the other hand, the feeding value is derived to a large extent from albuminoids and fats.



The chief function of the carbohydrates is to supply heat and mechanical energy, and when fed in large quantity they are also capable of producing animal fat. In this latter respect starch appears to be superior to sugar, especially in the case of ruminant animals.

*Fat and Oil.*—The fats and oils are essentially heat-producers, and, weight for weight, are nearly  $2\frac{1}{2}$  times as valuable for this purpose as the carbohydrates. When sufficient heat-forming food has been consumed to maintain the temperature of the body, fats and oils may be converted into animal fat, and so increase the body-weight. Whether for the production of heat or fat, the fats and fatty oils are far superior to either albuminoids or carbohydrates, but their use is restricted to moderate quantities by practical considerations. Of the foods in common use linseed, soy beans, linseed cake, and decorticated cotton cake are the richest in fat, after which come dried grains, soy bean cake, undecorticated cotton cake, oats, and maize.

*Crude Fibre.*—"Crude Fibre" is that portion of the food-stuff which remains undissolved after boiling in weak acid and alkali. It represents those ingredients which are of a more or less woody character, and it is essentially an admixture of cellulose with highly indigestible substances (lignin, cutin). Its value for feeding purposes varies widely according to its mechanical character and the class of animal to which it is fed. All farm animals have considerable powers of digesting the soft fibre of green food, but only cattle and sheep can derive appreciable nourishment from the hard fibre of foods like straw. Horses occupy an intermediate position in this respect, whilst pigs can only deal effectively with the softest types of fibre.

A high proportion of crude fibre, unless it is normal to the food in question (*e.g.*, undecorticated cotton cake), should always be regarded with suspicion, since it usually indicates the presence of husks or other highly indigestible material.

In general, foods containing more than about 10 per cent. of crude fibre will require special care in their use, especially if the fibre is largely in the form of hairs or "woolly" material.

*Mineral Matter.*—Mineral matter, although performing an

indispensable function in animal nutrition, may be neglected in arranging diets for mature animals, as it is usually present in sufficient quantity in all foods. This constituent of food is of more importance in arranging diets for young, growing animals. It is then especially important that the ration shall supply suitable quantities of lime and phosphoric acid, since these ingredients enter so largely into the composition of the bones. The supply should be ample, but in the case of phosphoric acid not very excessive.

The mineral matter of foods should not include more than a very small proportion of sand, as this is indicative of dirt. It is impossible in practice to ensure that foods shall be absolutely free from contamination of this character, but there can rarely be any valid excuse for the presence of more than, say, one or two per cent. of sand in a food.

#### *Digestibility of Foods.*

It is usually not difficult to get an analysis of a food stating the proportions of albuminoids, oils, and carbohydrates present. Such an analysis, however, gives no information as to the digestibility of each ingredient, and yet it is only the digestible portions that can be regarded strictly as food. Except in the case of albuminoids, this information cannot be obtained in the laboratory, but recourse must be had to actual trials with animals. For the purposes of the valuation of foods, however, it will be sufficiently precise to take the average digestibility as tabulated on p. 225. A table giving the percentages of digestible constituents in average samples of the commoner feeding-stuffs will be found in Leaflet No. 79, p. 2.

#### *Productive Value of the Digestible Matter of Foods.*

One further consideration requires to be taken into account before a reliable estimate of the value of the food to the animal can be secured. The materials digested by the animal from a foodstuff cannot be applied solely and entirely to productive purposes such as the production of milk, meat, or work. Even the most easily digested foodstuff requires to be masticated and forced along the alimentary tract, and in other ways causes extra labour to the animal. The supply of the energy required for this labour is a first charge upon the nutrients



digested from the food, and only the balance is available for the productive purposes of the feeding. The tougher and more indigestible the food is, the greater will be the amount of digestible material diverted to unproductive purposes, and the lower will be the direct value of the food to the animal. In other words, if foods of very different character (*e.g.*, maize and undecorticated cotton cake) are compared, it is necessary to know not only the *amount* and *character* of the digestible matter in the food, but also its "*availability*" to the animal. The chief determining factor is the proportion and character of the crude fibre in the food, and in the case of all foods that are not markedly rich in crude fibre, no serious error will be committed if the digestible nutrients are regarded as fully "*available*." In the case of fibrous foods, however, the value of the digestible matter will be considerably overrated if the presence of an abundance of crude fibre is not taken into account (see later).

#### *Manurial Ingredients in Foods.*

All foods contain appreciable quantities of valuable manurial ingredients, notably nitrogen, phosphates, and potash. These ingredients are voided to a considerable extent in the solid and liquid excrements of the animals which consume the food. In the case of full-grown fattening animals or working horses practically all the fertilising ingredients are recovered in this way, but in the case of young animals and cows in milk the proportion recovered will be lower. The proportions of nitrogen, phosphates, and potash present vary greatly in different foods, and the value of the manurial residues arising from the consumption of equal weights of the foods varies accordingly. This fact must be taken into account in comparing the cost of different foods, since the real cost of a foodstuff to the farmer is obviously the price less the manurial value.

The latter value can only be assessed roughly and is subject in practice to great variations. For comparative purposes, however, the values given in the Table on p. 225 may be used.

#### *Comparative Values of Foods.*

Attempts have frequently been made to devise a satisfactory system of direct valuation of feeding-stuffs on lines com-

parable with those followed in the valuation of manures (*see* Leaflet No. 72). "Unit" prices for albuminoids, fats, and carbohydrates have been calculated from the market prices of different foodstuffs, and these have then been used for valuation purposes. The system proves far more unreliable in its application to feeding-stuffs, however, than in the case of manures, owing to the fact that, unlike the latter, the market prices of different foodstuffs are regulated with but little regard to their composition. For this and other reasons the direct method has been generally abandoned in favour of the comparative method in which the value of a foodstuff is estimated by comparison with the price at which another of similar character and known composition can be obtained.

Two such methods are explained below, the first of which can claim little scientific basis, but is found to work fairly well in practice, and is commonly used, whilst the second method is more scientific but more complicated.

**FIRST METHOD.**—For the purposes of the comparison it is assumed that digestible albuminoids and fats are worth  $2\frac{1}{2}$  times as much as digestible carbohydrates. The percentages of digestible albuminoids and oil are therefore added together and their sum multiplied by  $2\frac{1}{2}$ . To the figure thus obtained is added the percentage of digestible carbohydrates, and the total is referred to as the number of "food-units" in the material. The price of a food-unit in one particular foodstuff is then ascertained by dividing its price per ton by the number of food-units contained in it. This "unit-value" can then be used as a standard by which to gauge the value of other similar foodstuffs of known composition. The following examples will illustrate the method.

*Example I.*—Suppose that two linseed cakes are offered with the guaranteed compositions and at the prices stated—

	A.	B.
Albuminoids ... ..	32 per cent.	28 per cent.
Oil ... ..	11 "	9 "
Sol. Carbohydrates ... ..	34 "	35 "
Price per ton ... ..	£9	£8 10s.

The numbers of food-units in each cake will be as follows:—

$$\begin{aligned} \text{Cake A } (32 + 11) \times 2\frac{1}{2} + 34 &= 141\frac{1}{2}, \text{ or say, } 141 \\ \text{Cake B } (28 + 9) \times 2\frac{1}{2} + 35 &= 127\frac{1}{2}, \text{ ,, } 127 \end{aligned}$$



In the case of Cake A, 141 units are obtainable at a cost of £9, and the cost per unit is therefore  $\frac{£9}{141} = 1s. 3\frac{1}{4}d.$  Hence if Cake B is to be relatively equal to it in cost, the price per

Digestibility (per cent.) and Manure Values (per ton)  
of the Commoner Feeding-stuffs.

Feeding-Stuff.	Digestibility Per Cent.*				Estimated Value of Manurial Residues arising from Consumption of One Ton of Feeding-Stuff. (Hall & Voelcker.)†
	Albu- minoids.	Fats.	Soluble Carbo- hydrates.	Crude Fibre.	
Decorticated Cotton Cake	85	94	67	28	£ s. d. 2 16 5
Undecorticated "	77	93	52	18	1 13 9
Linseed Cake ... ..	86	92	78	32	1 18 7
Linseed ... ..	91	86	55	60	1 10 6
Soy Bean Cake ... ..	90	88	95	50	2 13 6 <sup>+</sup>
Soy Beans ... ..	89	90	69	36	2 1 8 <sup>+</sup>
Cocoonut Cake ... ..	78	97	83	63	1 11 6
Beans ... ..	87	83	91	58	1 11 8
Peas ... ..	86	65	93	46	1 7 4
Locust Beans ... ..	68	53	95	58	0 12 2
Bran (Wheat) ... ..	79	71	71	26	1 8 11
Malt Culms ... ..	80	71	73	55	1 15 11
Brewers' Grains (Wet) ...	73	86	62	40	0 6 0
" (Dried) ... ..	71	88	60	48	1 4 3
Rice Meal ... ..	57	85	80	15	0 14 3
Wheat ... ..	84	64	92	50	0 14 10
Barley ... ..	70	89	92	48	0 13 9
Oats ... ..	76	80	76	28	0 15 5
Maize ... ..	72	89	95	58	0 13 0
Meadow Hay ... ..	57	51	64	59	0 16 4
Clover ... ..	54	53	64	46	1 1 9
Oat Straw ... ..	33	36	46	54	0 7 7
Barley ... ..	25	39	53	54	0 6 9
Bean ... ..	49	57	68	43	0 16 1 <sup>+</sup>
Pea ... ..	60	46	64	52	0 13 4 <sup>+</sup>
Potatoes ... ..	51	—	90	—	0 4 6 <sup>+</sup>
Mangolds ... ..	70	—	95	37	0 3 1
Swedes ... ..	80	84	95	74	0 2 6
Turnips ... ..	73	—	92	51	0 2 4

\* Digestion by ruminants, based upon summary by Kellner.

† In estimating these values the unit-value of nitrogen, phosphoric acid, and potash have been taken at 12s., 3s., and 4s. respectively, and it has been assumed that the combined excrements, when applied to the land, contain one-half of the nitrogen, three-quarters of the phosphoric acid, and the whole of the potash contained in the ton of food.

‡ Data for these foods are not included in Hall and Voelcker's table.

ton demanded must not exceed  $127 \times 1s. 3\frac{1}{4}d.$ , i.e., £8 1s. 6d. The price actually charged is thus probably somewhat in excess of the value of the cake as compared with Cake A at £9 per ton.

In this example two foods composed of practically the same ingredients are compared, and the assumption has been made that they are therefore of equal digestibility. If the foods are of similar character, but composed of different ingredients (*e.g.*, a linseed cake and a soy bean cake), the procedure is precisely the same except that the percentages of *digestible* albuminoids, &c., must first be calculated in each case from the guaranteed percentages of total albuminoids, &c., and then the sum of the digestible food units calculated from them. The following example will illustrate this case.

*Example II.*—Suppose it is desired to compare the linseed Cake A (Example I.) with a decorticated cotton cake containing 40 per cent. of albuminoids, 9 per cent. of oil and 72 per cent. of carbohydrates at £8 15s. per ton.

Using the data given in the Table on p. 225, the percentages of digestible nutrients in these foods are obtained as follows:—

	Linseed Cake.		Decorticated Cotton Cake.	
	Total.	Digestible.	Total.	Digestible.
	Per cent.	Per cent.	Per cent.	Per cent.
Albuminoids ... ..	32	$\times \frac{86}{100} = 27\frac{1}{2}$	40	$\times \frac{86}{100} = 34\frac{1}{2}$
Oil ... ..	11	$\times \frac{92}{100} = 10$	9	$\times \frac{94}{100} = 8\frac{1}{2}$
Carbohydrates ... ..	34	$\times \frac{78}{100} = 26\frac{1}{2}$	27	$\times \frac{67}{100} = 18$

Then the total numbers of *digestible* food-units in each case are:—

$$\begin{array}{ll} \text{Linseed Cake} & \dots (27\frac{1}{2} + 10) \times 2\frac{1}{2} + 26\frac{1}{2} = 120 \\ \text{Decort. Cotton Cake} & (34\frac{1}{2} + 8\frac{1}{2}) \times 2\frac{1}{2} + 18 = 125 \end{array}$$

The cost per digestible food-unit of the linseed cake is  $\frac{£9}{120} = 1s. 6d.$  At this rate the decorticated cotton cake should be worth  $125 \times 1s. 6d.$ , or £9 7s. 6d. per ton.

In this method of comparing the prices of feeding-stuffs it is assumed that the differences in manure-values will be sufficiently allowed for in the high value that is assigned to the albuminoids, since it is the nitrogen contained therein that mainly determines the differences in manure-value between different foods.



The method works fairly well in practice so long as only materials of similar character are compared, but is very unreliable if applied to foods of widely differing character.

**SECOND METHOD.**—In this method the manure-value per ton of the foodstuff (*see* Table, p. 225) is first deducted from the price, and the balance then regarded as the nett cost. The subsequent procedure is then similar to that used in the first method, except that only the percentage of digestible oil is multiplied by  $2\frac{1}{2}$ , the albuminoids in this case being ranked equal only to the carbohydrates. This is in accordance with the most recent determinations of the relative values of the nutrients *to the animal* for productive purposes. Other factors which tend to raise the *market* value of albuminoids beyond this level will be discussed later.

For the purposes of illustration the case of the linseed cake and decorticated cotton cake compared in Example II. above may be taken. In each case the nett cost per ton is equal to the price per ton, *less* the manure value per ton; thus:—

		Nett Cost per Ton.
<i>Linseed Cake</i> ...	£9	— £1 18s. 7d. = £7 1s. 5d.
<i>Decort. Cotton Cake</i>	£8 15s.	— £2 16s. 5d. = £5 18s. 7d.

The number of food “units” in each case will be—

<i>Linseed Cake</i> ...	$(10 \times 2\frac{1}{2}) + 27\frac{1}{2} + 26\frac{1}{2} = 79.$
<i>Decort. Cotton Cake</i>	$(8\frac{1}{2} \times 2\frac{1}{2}) + 34\frac{1}{2} + 18 = 74.$

The cost per “unit” of the linseed cake will be  $\frac{£7\ 1s.\ 5d.}{79} = 1s.\ 9\frac{1}{2}d.$  At this rate the nett cost of the cotton cake should not exceed  $74 \times 1s.\ 9\frac{1}{2}d.$ , or £6 12s. 7d. This will represent a market price of (£6 12s. 7d. + £2 16s. 5d.) or £9 9s. per ton.

This method of assessing the comparative values of food-stuffs can be used with slight modification for the comparison of foods of very different character. In this case the “food-unit” totals by themselves are not a true measure of the relative values of the foods to the animals, since they take no account of the fact that the matter digested from an easily digestible food is utilised in the animal much more efficiently and economically than the matter digested from a more indigestible food. This difference turns largely upon the amount and character of the crude fibre present in the different

foodstuffs, and may be allowed for by deducting from the total of food-units (including in this case the digestible fibre) one unit for every 3 per cent. (or 2 per cent. in the case of hays and straws) of crude fibre (total) present in the food.

Thus, suppose it is desired to compare the decorticated cotton cake of Example II. with an undecorticated cotton cake containing 22 per cent. of albuminoids,  $5\frac{3}{4}$  per cent. of oil, 34 per cent. of carbohydrates and 20 per cent. of crude fibre. This composition would correspond (Table, p. 225) to the following percentages of digestible nutrients:—Albuminoids 17, oil  $5\frac{1}{2}$ , carbohydrates  $17\frac{3}{4}$ , and fibre  $3\frac{3}{4}$ .

Decorticated cotton cake of average quality will contain, say, 8 per cent. of crude fibre, and hence  $2\frac{1}{4}$  per cent. of digestible fibre.

Then the total number of food-units in each case will be—

$$\text{Decort. Cotton Cake} \dots (8\frac{1}{2} \times 2\frac{1}{2}) + 34\frac{1}{2} + 18 + 2\frac{1}{4} = 76.$$

$$\text{Undecort. Cotton Cake} \dots (5\frac{1}{2} \times 2\frac{1}{2}) + 17 + 17\frac{3}{4} + 3\frac{3}{4} = 52\frac{1}{4}.$$

These totals must now be subjected to the deduction, referred to above, based upon the percentages of crude fibre in each food. The corrected totals then become:—

$$\text{Decort. Cotton Cake} \dots 76 - \frac{8}{3} = 73.$$

$$\text{Undecort. Cotton Cake} \dots 52\frac{1}{4} - \frac{20}{3} = 45\frac{1}{2}.$$

The nett cost per unit of the decorticated cotton cake is then  $\frac{\text{£}5 \text{ } 18s. \text{ } 7d.}{73}$  or  $1s. \text{ } 7\frac{1}{2}d.$  At this rate the nett cost per ton of the undecorticated cotton cake should not exceed  $45\frac{1}{2} \times 1s. \text{ } 7\frac{1}{2}d.$  or  $\text{£}3 \text{ } 13s. \text{ } 11d.$  Adding to this the estimated manure value per ton of  $\text{£}1 \text{ } 13s. \text{ } 9d.$  (Table, p. 225) we arrive at an estimate of  $\text{£}5 \text{ } 7s. \text{ } 8d.$  per ton for the market value of this cake as compared with the decorticated cake at  $\text{£}8 \text{ } 15s.$  per ton.

The results arrived at by either of these methods require to be interpreted with caution, since the composition of a food is only one of several factors which determine what price the purchaser can afford to pay for it. Thus the one requirement which the farmer cannot, as a rule, entirely meet by means of home-grown foods is the all-important one for albuminoids. Carbohydrates abound in all common farm crops; oils can be largely dispensed with if necessary; but albuminoids can only be replaced to a very limited extent by these other ingredients. Hence the farmer enters the



market with his freedom of choice considerably hampered, and, in order to obtain a sufficiency of albuminoids, may find it necessary to purchase the relatively more expensive foods. It will, indeed, rarely be economical to buy foods rich in carbohydrates and correspondingly poor in albuminoids (*e.g.*, maize) except as substitutes for home-grown grain for the purpose of blending with other foods rich in albuminoids.

Again, the farmer may be so convinced of the superior merits of some particular food, say linseed cake, as to be willing to pay more for it than its composition alone would warrant; or, on the other hand, the demand for certain other foods may, owing to prejudice or other reasons, be so unsatisfactory, or the supply so excessive, as to cause the merchants to offer them at prices which are lower than their composition would seem to justify.

It is, therefore, desirable to select as a standard for purposes of comparison some foodstuff in common use the price of which is little subject to such abnormal influences, and is reasonably steady. In the examples given in the preceding pages linseed cake was used as the basis of comparison. The values arrived at for the other foods will err therefore, if at all, rather upon the high than upon the low side, since the general popularity of linseed cake always assures for it a relatively high price. At the present time Egyptian cotton cake usually serves as an excellent basis for the purposes of comparison.

THE Board of Agriculture and Fisheries desire to draw the attention of potato growers to the importance of spraying their crops with Bordeaux mixture as a protection against potato disease.

**Spraying with  
Bordeaux Mixture  
for Potato Disease.**

In wet seasons spraying is of great value, while even in dry seasons when no disease is apparent the treatment is found to be beneficial, producing a longer period of growth and an increased yield.

The crop should be sprayed twice, and the first spraying should take place as soon as there is a good development of haulm, towards the end of June or early in July, according to the locality and season. About three weeks later the treatment should be repeated.

Full directions for making and applying Bordeaux mixture are given in Leaflet 23 (Potato Disease), copies of which may be obtained on application to the Secretary, Board of Agriculture and Fisheries, Whitehall Place, London, S.W.

WITH the object of obtaining definite recommendations for the control of bovine tuberculosis, the American Veterinary Medical Association appointed in 1909 an international commission on the subject, the report\* of which was presented to the Association in September, 1910. The following is a summary of the recommendations made by the Commission, dealing with the dissemination and prevention of tuberculosis, the diagnosis of the disease, the disposition of tuberculous animals, and education and legislation on the subject.

**The Control of  
Tuberculosis  
in Cattle.**

*Dissemination and Prevention of Tuberculosis.*—As a general policy, it is suggested that all contact between tuberculous and healthy cattle, and between healthy cattle and stables, trucks, &c., which may contain living tubercle bacilli, should be prevented. The following specific recommendations are made :—

(1) There should be no sale or exchange of animals affected with tuberculosis, except for immediate slaughter or for breeding purposes under official supervision.

(2) That preference should be given at live stock shows to cattle known to be free from tuberculosis, and every precaution should also be taken to prevent contact between such animals and those not known to be free from disease.

(3) All live stock shippers should take every precaution to see that trucks in which the animals are conveyed are thoroughly cleansed and disinfected before use.

With the object of preventing the spread of infection, persons buying cattle for breeding purposes or milk production should, except when such purchases are made from disease-free herds which have been tested by a properly qualified person, purchase only subject to the tuberculin test. Moreover, all milk and milk bye-products used as food should

\* The Report has since been reprinted as Circular 175 of the U.S. Dept. of Agriculture, Bureau of Animal Industry.



be properly pasteurised unless from cows known to be free from tuberculosis.

None of the methods for the immunisation of animals against tuberculosis are recognised as having passed sufficiently beyond the experimental stage.

*Diagnosis of the Disease.*—With regard to the tuberculin test the Commission are of opinion that tuberculin, properly used, is an accurate and reliable agent for the diagnosis of active tuberculosis. Tuberculin may not, however, produce a reaction when the disease is in a period of incubation, when the progress of the disease is arrested, or when the disease is extensively generalised. In this last case, detection is usually possible by physical examination, while in the two former cases the disease may sooner or later become active, so that animals which have been exposed to infection should be re-tested with tuberculin every six months. The tuberculin test should not be applied to any animal having a temperature higher than normal. The subcutaneous injection is the only method of making the tuberculin test that is recommended by the Commission; but when an animal has given a positive reaction in any properly conducted test, it should thereafter be regarded as tuberculous, and such reaction should be considered sufficient evidence upon which to declare the herd infected.

The Commission recognises that the discovery of tuberculosis in animals slaughtered for food purposes furnishes one of the best possible means of locating the disease on the farm, and some system of marking should therefore be adopted for purposes of identification.

*Method Recommended.*—As a general policy in the eradication of tuberculosis, the separation of healthy and diseased animals, and the formation of healthy herds are recommended. If a herd is found to be extensively infected (*i.e.*, 50 per cent. or more of diseased animals), even the apparently healthy animals should be regarded with suspicion until they have been separate from the reacting animals for at least three months. Such a herd should not be treated by the method of general separation. The formation of a new herd from the offspring only is advisable.

In the case of herds containing less than 15 per cent. of

diseased animals, separation of the diseased animals from the healthy animals, and the formation of a sound herd from the healthy animals and the offspring of both are advocated. Herds coming between these figures may be treated by either method at the option of the owner, who should in any case be allowed to reject either method and have his herd dealt with by removal and slaughter of diseased animals. It is recommended that the administrative authority, on becoming aware of the existence of tuberculosis in a herd (to which a policy of slaughter and compensation cannot reasonably be applied), should require the owner to adopt one of the above methods, according to the proportion of diseased animals. If the owner objects his entire herd should be closely quarantined and sales therefrom entirely prohibited. When slaughter is necessary compensation is recommended, and the utilisation, as far as possible, of the meat of such animals as may be found fit for food.

*Education and Legislation.*—A knowledge on the part of the farmer of the cause and character of the disease, and its methods of dissemination, is necessary if the measures for eradication are to confer the greatest possible benefit; and co-operation should be secured between veterinary surgeons, live stock owners, legislators, and the general public.

Legislation is advocated providing for the compulsory notification by owners and veterinary surgeons of the existence of tuberculosis in a herd. Legislation is especially required to prevent the sale, distribution, or use of tuberculin by any persons other than those acting with the full knowledge or under the direction of official authorities.

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THE usual practice in milk production is to keep up the temperature of cow-houses in winter as much as possible.

**Influence of  
Ventilation on  
Milk Yield.**

Warmth, however, is only secured by the exclusion of fresh air, the temperature being raised by the heat from the animals' bodies, with the result that the air becomes much polluted. It has been recognised in recent years that this system is likely to be injurious to the health of the animals, and particularly as being conducive to tuber-



culosis. Numerous experiments\* have been carried out by the Highland and Agricultural Society of Scotland since 1908 in order to ascertain how far the milk production and the general health of cows are influenced by warmth produced in this way, and whether better results would not be obtained by the free admission of fresh air. The result of these investigations would appear to show that in the temperatures we are accustomed to in Britain too much importance has been attached to heat and too little importance to fresh air. Any benefits which might have been derived from the higher air temperature were nullified by the contaminated condition of the atmosphere, while the greater consumption of food which was expected as the result of the lower temperature has not always been experienced, owing to the healthier condition and better digestion of the animals enjoying the fresh air, which has enabled them to make better use of their food.

The plan followed in these experiments was to erect a complete temporary division across the cow-house, dividing it into two parts, one of which was freely ventilated while in the other the ventilation was arranged so that except in frosty weather the temperature remained steady between 60° and 63° F., and did not exceed 65°. In the winter of 1909-10 the experiment was conducted in five byres in Scotland, all being in fairly open situations. The air space per cow in the byres varied considerably. Among the freely ventilated byres the least space was 525 cubic feet per cow, and the greatest 1,268 cubic feet per cow; the less freely ventilated byres varied in the same way from 480 to 1,432 cubic feet per cow. Taking all the byres, the average space was 843 cubic feet per cow with free ventilation and 839 with restricted ventilation, so that the conditions may be regarded as equal in this respect.

The degree of purity of the air was tested by the proportion of carbon dioxide in samples taken periodically. In this way the air of the byres where the ordinary system of restricted ventilation was in force was found to be much more impure than that of the ventilated byres. In the former, with an average temperature of 57° F., varying from 41° to 69°, the

\* *Journal*, October 1909, p. 550, and December 1909, p. 755.

average proportion of carbon dioxide in the air was thirty parts in 10,000, while in the latter, with an average temperature of 49° F., varying from 32° to 65°, the proportion was fifteen parts. It may be added that the difference in the degree of ventilation was very noticeable in practice; and the sensations of an ordinary observer would have led him to expect a more considerable contrast than is shown by these figures. Yet in spite of this the bad ventilation was by no means exceptional, and it is stated that even the worst ventilated of these byres would have seemed cooler and better ventilated than a large number in use throughout the country.

The influence of temperature on milk-yield was not specially considered, as no attempt was made to combine free ventilation with a good temperature kept up by artificial heat. The point investigated was whether in practice it would not be better to ventilate cow-houses freely in winter and ignore the necessarily lower temperature produced, and the result is definitely in favour of ventilation. A comparison of the quantity of milk produced under the two systems showed that the production of milk can be carried on at least as profitably in byres ventilated down to 50° F. as in those in which the temperature is kept ten degrees higher by bad ventilation.

Incidentally it has been brought out—

(1) That any restriction of ventilation sufficient to bring the temperature of a byre up to 60° F. leads to a degree of atmospheric impurity inconsistent with conditions of perfect health.

(2) That in byres in which the temperatures have been kept down by thorough ventilation in autumn, cows do not suffer either in health or milk yield even from very low temperatures in winter.

(3) That whatever waste of food may be entailed in the maintenance of the body-heat of cows in colder byres is more than counteracted by the influence of fresher air; while it is evident that the health of animals is much more likely to be promoted by active digestion than by the mere prevention of loss of body-heat. It should also be observed that the colder temperature in autumn causes the cows to grow and retain thick coats of winter hair; so that it is not even certain that the body-heat is better conserved in the less ventilated



byres than in those which permit the animals to retain their natural coverings.

The practical rules that may be held to arise from the results of these experiments are as follows :—

(1) A careful attempt should be made to give such a degree and kind of ventilation as will, without creating draughts, keep the temperature of the byre always down to 50° F.

(2) Special care should be exercised to keep the temperature of the byre well below this point in autumn and early winter in order that the cows may grow their winter covering of hair.

A DEPARTMENTAL Committee was appointed on April 11th, 1910, by the President of the Board of Agriculture and Fisheries to inquire into the cause of the continued prevalence of swine fever in Great Britain, and to report whether it is practicable to adopt any further measures with a view to secure its speedy extirpation. This Committee has now presented an interim Report (Cd. 5671. Price 2d.).

**Eradication of  
Swine Fever.**

At an early stage in its investigations, the Committee, after carefully considering the present position of scientific knowledge in relation to swine fever, came to the conclusion that immediate further investigation was desirable into the following matters :—

(a) To what extent it is possible for contagion to spread by infective excretions being carried mechanically by attendants and animals other than swine.

(b) Whether external parasites, such as certain lice, carry the disease from sick to healthy swine.

(c) Whether pigs which have, to all appearance, recovered from swine fever remain long infective to other swine.

(d) Whether apparently healthy pigs which have been exposed to infection are capable of transmitting the disease as carriers.

(e) For what period it would be safe to consider swine which have recovered from swine fever to be immune against a further attack.

(f) What use, if any, could be made of artificial methods of immunisation to expedite the eradication of swine fever.

(g) Whether any of the methods which have lately come

into use in connection with other diseases could be employed in the diagnosis of non-typical cases of swine fever.

Experimental work in connection with these questions is in progress, and will form the subject of a subsequent report. The present report deals, therefore, more especially with administrative questions. The Committee state that many criticisms have been offered as to different aspects of the present administration, and various suggestions have been made by witnesses, but both criticisms and suggestions have been of a conflicting and contradictory nature. No case has been made out for any radical change in the administrative machinery now employed by the Board.

The Committee are satisfied that—

(i) The administrative control must remain, as now, in the hands of the central authority—*i.e.*, the Board of Agriculture and Fisheries.

(ii) Restriction on movement, including movement from markets, must continue to form an essential part of any measures adopted to extirpate swine fever.

(iii) The policy of "slaughtering out" in the case of all outbreaks now in force in Scotland and Wales should be applied to the country generally as soon as practicable.

(iv) The present scale of compensation should be maintained.

(v) In the general interest of the industry the size of infected areas should be kept as small as possible, due regard being had to the object in view.

Much ignorance and misconception exists as to the nature of the procedure now employed in the attempt to eradicate swine fever. Cordial co-operation between pig-owners and the authorities, both central and local, is thereby rendered difficult of attainment. Every effort should be made to remove these fruitful sources of friction.

The attention of the Committee has also been called to the confusion arising from the want of uniformity in the printing of licences and declarations required by the Board's Orders. It is important that all local authorities should co-operate cordially with the Board, and should adopt a completely uniform system of procedure with respect to the granting of licences and standard forms, both as regards size and colour, for licences and declarations.

The Committee make the following recommendations :—

(i) In order to extirpate swine fever the policy should be adopted as rapidly as possible under which : (a) All swine known to have been, or reasonably suspected of having been, exposed to the contagion of swine fever should be slaughtered, with compensation ; (b) the movement of swine from markets should be controlled by licence requiring subsequent isolation.

(ii) The whole of the expenditure incurred by the Board of Agriculture and Fisheries should be borne by the Exchequer.

(iii) The general restrictions on the movement of swine should be maintained.

(iv) Article 16 of the Swine Fever Order of 1908 should be made compulsory as regards paragraph (1), which provides (a) for the owner of any boar kept for service of sows other than his own keeping a register ; (b) every pig-dealer keeping a register of purchases and sales ; and (c) in respect of all carts in which swine are conveyed to markets, sales, or fairs, the carts to be disinfected by the local authority before leaving the market, sale, or fair.

(v) Castrators should be required by the Board to keep registers of their operations.

(vi) The validity of licences for movement should be extended to eight days.

(vii) A completely uniform system of procedure should be adopted by all local authorities, both as regards the granting of licences and the interchange of declarations.

(viii) To secure uniformity, forms required by the Board's Orders should be put on sale by H.M. Stationery Office.

(ix) Steps should be taken by all local authorities to secure the collection of all licences for movement immediately after use.

(x) Insanitary premises on which outbreaks have occurred should be kept closed until the alterations necessary for thorough disinfection and for preventing the danger of the spread of disease in case of the re-introduction of infection have been carried out.

(xi) All swine exposed in markets, sales, and fairs should be inspected by a veterinary inspector employed and paid by the local authority.



PART II. of the Report of the Land Division\* for the year 1910 deals with the proceedings of the Board of Agriculture and Fisheries under the Acts relating to Allotments, Universities and College Estates, Glebe Lands, Improvement of Lands, Settled Land and Agricultural Holdings. Part I., which has been already issued, dealt with the proceedings under the Small Holdings Act.

**Provision of Allotments by Parish and other Councils.**

In accordance with Section 59 of the Small Holdings and Allotments Act, 1908, the Board have called for returns of the proceedings of every Town Council, Urban District Council, and Parish Council in England and Wales in relation to allotments during the year 1910, and the opportunity has been taken to obtain information as to the total quantity of land which is held by the various Councils for allotments, and the number of tenants to whom it is let.

The total number of allotment authorities under the Act is over 8,000, and returns have been received from 7,600 of them. In the great majority of cases, however, the returns showed that no land was held for allotments, no applications had been received, and no proceedings taken. The number of returns which showed that some action had been taken in regard to allotments, either in 1910 or in previous years, was 1,933, 1,500 being from Parish Councils, 277 from Urban District Councils, 155 from Town Councils, and 1 from the London County Council.

The total quantity of land let for the purpose of allotments by the various Local Authorities in England and Wales on December 31st, 1910, was 27,838 acres, of which 6,094 acres were the property of the Councils, and 21,744 acres were leased. This land is let to 100,498 individual tenants and 21 Associations.

In rural parishes it is usually possible to obtain allotments from private landowners direct, and there is, therefore, no need for the intervention of the Parish Council, but in large towns this is less often the case, and it is, therefore, satisfactory to notice that out of the 73 County Boroughs in England and Wales allotments have been provided by the Town Councils in 41 of them.

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\* Cd. 5648. Price 3d.

Applications were received for allotments during 1910 from 15,647 individuals and 7 Associations, and the total quantity applied for was 4,436 acres. Allotment authorities are empowered by the Act to erect dwelling houses for occupation with any allotment of one acre or more, and 33 applications for houses were received during the year, but at present none have been actually erected by any of the authorities.

The returns received show that 1,582 acres have been acquired for allotments during the year 1910, as compared with 2,407 acres in 1909. The quantity purchased is 250 acres, and the price paid £23,569; while the quantity leased is 1,332 acres, for which rents amounting to £2,958 are paid. The average price of the land purchased is £105 an acre, and the average rent of the land leased £2 4s. 6d. an acre.

There were 4,979 individual applicants and 5 Associations in England and Wales provided with allotments by local authorities on the land acquired during 1910, and in addition a large number of applicants have been provided with allotments on land which was acquired before 1910. The returns received show that there is at present an outstanding demand, which has not been satisfied, from 11,214 individual applicants and 11 Associations, and that the quantity of land required to satisfy them is 4,974 acres.

## SUMMARY OF AGRICULTURAL EXPERIMENTS.\*

### SOILS AND MANURING.

**Composition of Gas Lime** (*Jour. Agric. Science*, Vol. iii., Pt. 3, September, 1910).—Analyses of two samples of gas lime were made by Mr. P. J. Bhatt in the laboratory of Cambridge University Department of Agriculture. One sample was described as carbonised lime, and was shown by its analysis to be practically moist calcium carbonate. The second sample was described as sulphided lime. This contained small but definite quantities of free sulphur, sulphur compounds, and cyanides, which might be harmful to crops or possess some fungicidal power. To test these points, growing cress and clover were treated with solutions of both samples at various strengths. In the weaker solutions no action was observed, but with a 10 per cent. solution a distinct check on the growth took place, especially in the case of the sulphided lime. Neither material, however, seemed likely to be dangerously

\* A summary of all reports on agricultural experiments and investigations recently received will be given each month. The Board are anxious to obtain for inclusion copies of reports on all inquiries, whether carried out by agricultural colleges, societies, or private persons.

poisonous to crops growing on land to which it might be applied. The sulphided lime was found to have some fungicidal power, 10 per cent. solutions preventing spores from germinating, but its fungicidal properties did not seem strong enough to give it any practical value. The solutions of carbonated lime had no appreciable effect on the germination and rate of growth of the spores.

**Composition of Soot** (*Jour. Agric. Science*, Vol. iii., Pt. 4, December, 1910).—The value of soot as a manure depends upon the ammonia contained in it, as well as upon its beneficial effect on the texture of the soil, and its power of diminishing the attacks of slugs and snails. The quantity of ammonia or nitrogen in soot, however, varies greatly, and this investigation was carried out by Mr. H. W. Harvey, of Cambridge University Department of Agriculture, in order to throw some light on the relation between the general characteristics of soot and its nitrogen content. One sample of soot from a kitchen chimney was found to contain 11.0 per cent. of nitrogen, and weighed 9 lb. per bushel, loosely packed. In the other samples from dwelling-houses the nitrogen varied from 5.5 to 2.7 per cent., and the weight from 18½ to 33 lb. per bushel, the lighter soots usually containing the greater proportion of nitrogen. Thus the general opinion of farmers that a light soot is best is well borne out. Owing to this, the safer method would be to buy soot by volume instead of by weight, as the buyer will then be likely to get an approximately constant quantity of nitrogen per bushel. Most of the samples mentioned contained approximately 1 lb. of nitrogen per bushel, and the soot would be worth about 6d. per bushel for its fertilising value alone, apart from its action on the soil or on insect pests.

A sample of flue dust from a 40 ft. boiler shaft contained only 0.5 per cent. of nitrogen. This sample was of a reddish colour, but the colour alone could not be relied upon to show its nature, since a sample from a kitchen chimney with 5.4 per cent. of nitrogen also had a distinctly reddish tinge. Flue dust from the Cambridge Rubbish Destructor, similar to that from the London Destructors which is used extensively upon the hop-fields of Kent, contained no nitrogen, and was composed almost entirely of inorganic matter, mostly oxides of aluminium and iron with calcium carbonate.

**Calcium Cyanamide and Nitrate of Lime** (*Lancs. C.C. Educ. Com. Agric. Dept., Farmers' Bul. No. 20*).—The four nitrogenous manures, nitrate of soda, sulphate of ammonia, calcium cyanamide or nitrolim, and nitrate of lime, were used in 1910 on oats, mangolds, and potatoes. The nitrogen contained in each was as follows:—

Sulphate of ammonia (24 per cent. ammonia)	...	...	20 per cent.
Nitrate of soda (95 per cent. purity)	...	...	15½ "
Calcium cyanamide	...	...	18 to 20 "
Nitrate of lime	...	...	13½ "

They were applied in quantities containing approximately equal amounts of nitrogen, and the results appeared to show that the same amount of nitrogen in any of the four forms is equally effective for crop production. The extension of the use of the two new manures will therefore depend largely upon the price per unit of nitrogen contained in them. Both are less convenient to handle than the older manures, calcium cyanamide being very light and dusty, and liable to cause injury



to young and tender plants, while nitrate of lime absorbs moisture very readily, and becomes difficult to sow.

**Liming of Meadow Land** (*Lancs. C.C. Educ. Com. Agric. Dept., Farmers' Bul. No. 17*).—These experiments have been carried out since 1906 to ascertain whether ground limestone could be substituted for cob-lime and ground-lime. Both these when used upon the land become changed into carbonate of lime, and if finely ground limestone or carbonate of lime could be used instead, the expensive process of burning\* the rock could be dispensed with. A ton of cob or ground lime is converted by exposure to the air into  $1\frac{3}{4}$  tons of carbonate of lime, so that in the trials  $1\frac{3}{4}$  tons of ground limestone were used in comparison with one ton of each of the other forms. In spite of this, the cost of the dressing of ground limestone was, owing to its low price, at first less than that of cob-lime or ground-lime; but its price has steadily risen since 1906, and in 1910 the cost per acre of each application was: cob lime, 14s. 8d.; ground lime, 20s. 8d.; ground limestone, 17s. 6d. In the four seasons, 1906 to 1909, the plot on which ground limestone was used has produced the heaviest crop of hay; and when the cost of the liming is taken into account, this has been the most profitable form to use. It is concluded that this is a quite suitable form in which to apply lime. It has given the most remunerative results up to the present, but as the price has been gradually rising, farmers may later find it more profitable to use one of the other forms. It is recommended that the ground limestone used should contain at least 95 per cent. of carbonate of lime, and should be finely ground, not less than 40 per cent. passing through a sieve having 10,000 holes to the square inch. Samples more finely ground can be obtained, but they are more costly.

**Manuring of Potatoes** (*Hereford C.C. Agric. Educ. Sub-Com., Farmers' Bulletin, No. 2*).—The experiment sought to ascertain the effect of omitting potash from a complete dressing of artificials for potatoes and the effect of replacing pure sulphate of potash (50 per cent. potash) by potash manure salts (31 per cent. potash), these salts having given good results in Scotland. The values of sulphate of ammonia and nitrate of lime as sources of nitrogen were also compared.

A dressing of about 12 tons of farmyard manure was given in each case. Sulphate of potash proved superior to potash manure salts, the increased yield from the dressings containing these being 2 tons 19 cwt., and 2 tons 5 cwt. respectively. Nitrate of lime was found more effective than sulphate of ammonia, the increased yields being 3 tons 12½ cwt. and 2 tons 5 cwt. respectively. The omission of potash from the dressing resulted in an average reduction of 26 cwt. of potatoes per acre. The artificials used in each case gave a profitable return varying in amount from £1 17s. 9d. to £5 9s. 9d. per acre:

**Manuring of Mangolds** (*Hereford C.C. Agric. Educ. Sub-Com., Farmers' Bulletin, No. 3*).—Good results were obtained in 1908 and 1909 from the use of salt for mangolds, 3 cwt. of salt per acre having increased the yield by 3 tons per acre. In 1910 the trials were intended to test this point further, and, in addition, to ascertain the effect of nitrate of lime, and the results of using phosphates from two sources (superphosphate and bone flour) as compared with the use of superphosphate alone in the dressing.

The addition of 3 cwt. of salt to the dressing again increased the yield by 3 tons per acre. The increase due to the addition of nitrate of lime to the dressing was 1 ton 10 cwt., or a profit of £2 os. 8d., as compared with £1 2s. 8d. on the plot on which it was omitted. A dressing which contained 3 cwt. superphosphate and 1 cwt. bone flour was found much more effective than one containing 4 cwt. superphosphate, the increased yields over the unmanured plot being 6 tons 17½ cwt. and 5 tons 7 cwt., or a profit of £2 compared with £1 2s. 8d.

**Manuring of Swedes** (*Hereford C.C. Agric. Educ. Sub-Com., Farmers' Bulletin, No. 4*).—The objects of this experiment in 1910 were to compare nitrate of soda and sulphate of ammonia in a complete dressing of artificials for swedes to ascertain whether phosphates from one source would give better results than phosphates from two sources, and to find the effect of omitting potash from the dressing.

The mixture containing nitrate of soda did not yield so profitable a return as that containing sulphate of ammonia. Superphosphate alone gave a larger yield than superphosphate and bone flour or superphosphate and basic slag. The swedes grown on the plots receiving basic slag, however, were brighter-looking and suffered less from finger-and-toe than those receiving superphosphate alone. The result of including sulphate of potash in the dressing was to increase the yield by 18½ cwt. per acre, which more than met the cost of this ingredient in the manure. The dressing which gave the greatest yield was ½ cwt. sulphate of ammonia, 6 cwt. superphosphate, and ½ cwt. sulphate of potash per acre.

**Manuring of Meadow Hay** (*Hereford C.C. Agric. Educ. Sub-Com., Farmers' Bulletin, No. 5*).—Experiments have been carried out at two centres since 1906 on manuring meadow hay with farmyard manure (about 10 tons per acre), and complete and incomplete mixtures of artificials. The soil is deficient in lime, and in 1910 sub-plots were dressed with lime at the rate of 3 tons per acre.

The lime was applied rather late in 1910, but, in spite of its slow action, there was, on cutting in July, a net increase of 1¼ cwt. per acre on the limed over the unlimed plots. With regard to the effects of incomplete mixtures of artificials, the omission of phosphates caused the greatest diminution in the yield, then nitrogen, and lastly potash. It is recommended, therefore, that potash should only occupy a small proportion of the mixture, say not more than ½ cwt. sulphate of potash per acre. A complete mixture of artificials gave an average increase of 10½ cwt. of hay, with a profit of 7s. 6d. per acre over the unmanured plot. The most successful dressing used in the experiments was one of 10 tons of farmyard manure in alternate years, with 102 lb. sulphate of ammonia and 352 lb. superphosphate in the years when no farmyard manure was applied. This dressing gave an average crop of 43¼ cwt., or 16¼ cwt. more than the unmanured plot.

## FIELD CROPS.

**Varieties of Oats** (*Lancs. C.C. Agric. Dept., Farmers' Bulletin No. 18*).—In 1909 trials were made of Waverley (local and Irish seed), Mounted Police, Banner, Wide Awake, and Besseler's Prolific, the seed-

ing per acre being 5 bushels, and in 1910 of Banner, Wide Awake, Beseler's Prolific, Goldfinder, Abundance, and Thousand Dollar, the seeding varying from 5 to  $5\frac{3}{4}$  bushels. The oat crop in most cases followed first or second year's lea, but in one instance was preceded by a crop of cabbage. The dates of sowing varied slightly, according to district, but the different varieties at the same centre were sown at the same time. On one or two farms a light dressing of nitrate of soda was given as a top dressing, but in the majority of cases no manure was applied.

The varieties which braided early were also found to ripen early, Abundance being invariably among the earliest, while Goldfinder was usually very late. In the case of Waverley, Irish seed yielded better than English seed—54 bushels of grain per acre as compared with  $46\frac{1}{2}$  bushels per acre—and also gave a higher percentage of meal on milling. Beseler's Prolific gave the heaviest average yield of corn but ripened latest. There was little to choose between Banner and Wide Awake, both being early, tillering well, and producing the best quality of grain and straw. The results of the milling test gave Wide Awake 1,653 lb. meal per acre, and Banner 1,568 lb. per acre. Abundance compared favourably with the other varieties, but Goldfinder was a failure. Thousand Dollar proved an early oat of excellent quality and a moderate yielder.

**Varieties of Mangolds and Swedes** (*Midland Agric. and Dairy Coll., Buls. 5 and 6, 1910-11*).—Eight varieties of mangolds were grown on six different farms in the Midlands, each farmer following his own method of cultivation. The percentage of dry matter in each variety was tested, so that their feeding value could be more exactly compared by the total weight of dry matter produced per acre than by the crop. Compared in this way the best varieties were:—

	Total dry matter per acre. lb.	Crop per acre. tons cwt.
Golden Tankard ... ..	6,939	27 8
Lion Intermediate ... ..	6,845	32 13
Prizetaker ... ..	6,778	29 19
Windsor Globe ... ..	6,664	29 15

It will be seen that this year the greatest amount of dry matter was not produced by the variety with the heaviest yield. The number of "bolters" in each variety was noticed. In this respect the worst were Red Emperor, Red Intermediate, and Golden Tankard; Windsor Globe and Prizetaker were intermediate, and Normanton Globe, Lion Intermediate, and Prizewinner were almost free.

In the swede trials ten varieties, mostly bronze-tops, were grown on six farms. The differences between the varieties were not large, but the following were the best four, judged by the total quantity of dry matter produced:—

	Total dry matter per acre. lb.	Crop per acre. tons cwt.
Golden Melon ... ..	5,336	23 6
Magnum Bonum ... ..	5,206	22 4
Extra Improved Purple Top ...	5,165	21 4
Darlington ... ..	5,111	21 19



## WEEDS AND INSECT AND FUNGUS PESTS.

**Destruction of Charlock by Chemical Means** (*Mitteilungen der Deut. Landw. Gesell.*, April 29th, 1911, *Flugblatt*, No. 11).—The destruction of charlock (*Sinapis arvensis*, L.) and wild radish (*Raphanus Raphanistrum*, L.) is most effectively carried out by mechanical means, e.g., harrowing. Where such methods are inapplicable, or where they have not proved successful, the German Agricultural Society recommends the eradication of the weeds by chemical means. The method which has been found in Germany to be the best and cheapest is to spray the weeds with a solution of sulphate of iron at the rate of about 54 gallons of a 15 to 20 per cent. solution ( $\frac{3}{4}$  cwt. to 1 cwt. sulphate of iron) per acre. Smaller quantities will not ensure success, but larger quantities will do no harm. The addition of 5 per cent. of molasses is also recommended as causing the solution to adhere to the weeds more firmly. Care should be taken in the choice of a sprayer and the regular cleansing of the same.

Sulphate of iron applied in the form of a powder, whether as crystals or dried, is also effective if sufficient quantities are used (say 90 lb. per acre of the dry form, or 180 lb. per acre of the crystalline form), if the powder is evenly distributed, and if it is applied when the leaves are wet with dew. Its application is therefore only possible in the early morning in calm weather. Distribution by hand is difficult, and manure distributing machines should be used. Nitrate of lime is also effective in destroying charlock, but on account of its cost it should only be used where the crop under cultivation needs nitrogenous manuring. It should be applied at the rate of 90 lb. per acre.

All cereals may without hesitation be sprayed or powdered with sulphate of iron. The slight damage apparent at the commencement is unimportant, and as a rule further growth is favourably influenced. Clover, lucerne, and seradella sown among the grain crops will also stand the treatment. On the other hand, roots, potatoes, beans, vetches, and yellow and white lupins are injured, but peas and blue lupins are more resistant. Flax can also be sprayed if about 4 in. high.

The success of the treatment depends upon the time of spraying. The standing stems of the older weeds and their buds are not destroyed, and treatment should therefore take place before the appearance of the buds about the time the fourth leaf develops. Spraying should not be carried out when the plants are wet with rain or dew, or when rain is expected, but otherwise it may be undertaken at any time of the day, though cold or windy weather is prejudicial to the effectiveness of the operation.

**Remedies for Apple Sucker.**—In addition to the methods recommended in Leaflet 16 to be employed against Apple Sucker (*Psylla mali*), one of the Board's inspectors has found two remedies very useful during the last few years. These are respectively a nicotine wash of strength about 0.075 per cent., and a lime-and-salt wash containing 20 per cent. of lime and 2 per cent. of salt.

The nicotine wash has proved superior to paraffin emulsion, and is absolutely innocuous to leaves and flowers. It should be used after the young begin to hatch out. A solution of this strength was found

very successful at Woburn in 1908, 99 per cent. of the *Psylla* being killed in the case of ten dwarf apple trees sprayed on May 17th, when the blossom buds were just open. The wash does not appear to be injurious to bees.

The lime-and-salt wash should be applied in the middle of March or even later. Theobald\* recommends its application between the time of the opening of the buds and about two weeks beforehand. The action of the wash is described as forming a coating over the egg and so preventing the breaking of the shell and the escape of the young insect. Trees that have not borne fruit for several years have yielded after the use of this wash.

**Sclerotinia Disease of the Mangold.**—The Board have received an interesting note on the *Sclerotinia* disease of the mangold from Mr. Milburn, Ph.D., Secretary of Agriculture for the Education Department of the Lancashire County Council. This disease was referred to in this *Journal*, April, 1911, p. 45, as having been identified by Mr. Salmon, at the South-Eastern Agricultural College, Wye.

Mr. Milburn states that he first noticed the disease at Normanton Grange, Loughborough, in 1906. Several loads of mangolds lay in the farmyard, and almost every bulb had the black, button-like sclerotia on it; in fact, so numerous were they that the whole heap had a blackened appearance. Some were in the last stages of decay, but the bulk of them had one or two sclerotia in little "pits," or hollows, caused by the pecking of pheasants or the biting of slugs, while growing, round the bulb at the soil level. There was in these cases a blackening of the tissues in the immediate neighbourhood of the "pit." The matter was recorded in two occasions in the annual report of the Midland Agricultural College, and a specimen piece of mangold with the sclerotia in the "pits" is preserved at the College in spirit.

Mr. Milburn is of opinion that the disease is far more prevalent than is generally thought. In the mangolds of the Midland Agricultural College it has been observed annually; in fact, on close examination, few clamps are found entirely free. In view of the damage done by the above fungus, the practice of loading mangolds into carts by means of a fork, which breaks the skin and gives easy access to the fungus, is strongly to be deprecated.

Swedes, too, suffer from this disease, but not to the same extent as mangolds.

**Use of Carbon Bisulphide as a Remedy for Eelworm** (*Bulletin of Miscellaneous Information, Kew, No. 3, 1911*).—With a view to testing the accuracy of the statement that eelworm is killed by carbon bisulphide, as well as to ascertain the action of this substance on plants, some experiments have been carried out at Kew on plants in pots. In every experiment the carbon bisulphide was introduced into the soil through the drainage hole at the bottom of the pot by pouring it on the "crocks" so that it did not come in contact with the root of the plant in liquid form.

A *Begonia*, the roots of which were infested with a parasitic worm, *Fridericia bisetosa*, Levinson, was so treated with one dram of carbon

\* Report on Economic Zoology, 1907. See also *Journal*, vol. xviii, April, 1911, p. 48.

bisulphide. Three days after treatment, the lower leaves commenced to wilt and bleach, and at the end of a week all the fully-grown leaves were quite colourless, and collapsed. At this stage the plant was removed, and all the worms were found to be dead. Six different varieties of healthy *Pelargonium* were treated, three with one dram and three with half a dram each of carbon bisulphide. After three days the lower leaves in each case were very flaccid and almost bleached, and after a week all the full-grown leaves on every plant were bleached and dead. The plants were not, however, killed outright. On the other hand, a *Begonia* and a *Ulex*, each treated with three drops of carbon bisulphide, were not injured.

The experiments suggest that it would not be wise to attempt the treatment of pot plants in vigorous growth with carbon bisulphide with the object of eradicating eelworm, &c., but a precaution that may usefully be taken is to treat all leaf soil, dung, &c., before use, as *F. bisetosa* probably finds its way into the soil used by gardeners from such sources.

### HORTICULTURE, CIDER, AND HOPS.

**Classification of Varieties of Cider Apples** (*National Fruit and Cider Institute, Report, 1909*).—During the season of 1908-9 the making of cider and perry from individual varieties of fruit was continued. The chemical composition, rate of fermentation, and a description of the quality and characteristics of each are given. From the facts ascertained by these experiments, it has been found possible to classify the varieties into a number of groups, each of which may be represented by a more or less well-known variety as the type, and the method of treatment recommended for this sort may be taken as suitable for the other individual members of the same group. To give an example, one of the three main classes of cider apples, the "sharps" or "sour," may be divided up into a series of groups, represented respectively by Cap of Liberty, Kingston Black, Fair Maid of Devon, and Underleaf, with others which need not here be specified, as the type varieties. The Cap of Liberty group is normally characterised by the juice containing a comparatively large percentage of malic acid and a moderately large percentage of tannin, and fermenting also at a comparatively slow rate. Apples of this group are adapted for the production of a sweet cider of good quality after suitable blending. The kind of blending required is the addition of about equal parts of a variety of the class of "sweet" apples, belonging to a slow-fermenting group—which may be typified by Sweet Alford—and of a variety of a slow-fermenting, pronounced "bitter-sweet" type—of which Royal Jersey or Strawberry Norman may be quoted as examples; or an equally satisfactory blending may be obtained by the use of about two parts of a slow-fermenting, mild "bitter-sweet" apple of the Horner type.

A great difficulty met with in this connection is the differences shown by a variety in different seasons and conditions of soil, &c. A variety is on the average fairly consistent in behaviour and characters, but any particular sample may show great differences from the normal type in the degree of acidity, astringency, and sweetness of the juice, and also in the rate of fermentation, and the flavour and body of the mature cider. Since it has been shown in former years at the Institute that



the dominant factor in determining the quality of a cider is the quality of the fruit, the importance of the factors which cause these differences in the quality of the fruit is evident, and an investigation of them is being carried out. Among the most important of these factors are soil, climate, the vigour of the tree, and ripeness.

**Influence of Grass on Fruit Trees** (*National Fruit and Cider Inst., Report, 1909*).—The injurious effect of grass growing round fruit trees is well established, but an experiment has been begun to ascertain whether the gain in growth is sufficient to pay for the labour necessary to keep an area round each tree free from grass. Circles of 9 ft. and 6 ft. in diameter have been kept free from grass round the stems of apple trees of eight varieties since planting, and the effect produced has been measured by the diameter of the stems. The most interesting feature at present is that the advantage of the 9 ft. area over the 6 ft. area was almost entirely in the first two years that measurements were taken, *i.e.*, the third and fourth years after planting. Each year there has been an appreciable gain with both free areas over the trees planted in grass land, but in the fifth and sixth years after planting it has only been enough to justify the labour of keeping the smaller area free. This leads to the suggestion that instead of planting directly in grass land, as is customary, the better plan may prove to be to plant in cultivated land, which may afterwards be sown to grass, since apparently it is during the first season or two after planting that the tree reaps most benefit from the absence of grass in its proximity.

**Young or Old Trees for Planting** (*National Fruit and Cider Institute, Report, 1909*).—From the trees that were used in the above experiment, some conclusions are drawn as to the amount of loss in growth that results from planting large trees, up to seven or eight years old from the time of grafting. The trees ranged from three to seven or eight years old when planted. No measurements were made until 1906, two years after planting, but it may be assumed that the larger trees at that time were larger when planted, the difference in most cases being considerable. The percentage growths made by 1909 are given in the report, and it is shown that in nearly all cases the best growths were made by the trees that were smallest in 1906, and therefore presumably at planting. The significance of the results is increased by the fact that the older trees were varieties that are usually the strongest growers at the Institute, while the younger ones, which made the best growth, are the weakest growers there.

**Strawberry Runner Experiments** (*National Fruit and Cider Institute, Report, 1909*).—These trials were started in 1906, and have now been completed. The "first" runner is the first produced from the parent plant on a given stem, and the "second" is the next produced on the same stem. A larger yield has been obtained from the firsts in all three years 1907-9, and the difference in the last year was more pronounced than in either of the two previous years, so that the result is not merely on account of the "seconds," which, as might be expected, were more backward at the start, taking longer to reach full vigour. The total crop for the three years with five different varieties of strawberries was 1,517 lb. from "first" runners, and 1,207 lb. from "second" runners. Taking the varieties separately, President gave the greatest difference; while Royal Sovereign and Latest of All

gave results definitely in favour of the "first" runners. There was a slight balance in favour of the "first" in the case of Monarch, but Paxton's gave practically the same yield for both sets. There is therefore good evidence that "first" runners tend to be more fruitful than "second," and there is a sufficient margin of difference in the yields to make it a matter of practical importance to the grower to select only "first" runners for planting.

**Pruning of Gooseberries** (*National Fruit and Cider Institute, Report, 1909*).—Gooseberry bushes planted in 1905 have been since 1908 pruned on the "hard" and "light" systems respectively. In the "hard" system, which is usual outside fruit-growing areas, the leading shoots are clipped back fairly hard, and the laterals still harder, so that the bush becomes round and dense. In the "light" system the leading shoots are not cut back so closely, while the laterals are more reduced than in the other system. The result is a comparatively straggling and open bush. Ease and economy of time in gathering the fruit, and an improved quality of berry are the advantages claimed for the light system. The effect on the crop is disputed, and this experiment is intended to deal with the point. Before 1908 all the bushes were pruned on the hard system. Since then the crop for two years has been 1,531 lb. with the "hard" system, and 1,404 lb. with the "light," while the berries in the latter case have been superior in quality. The economy of labour and time is found to be markedly in favour of light pruning, and if the crops continue as they have begun there will be no doubt which is the more profitable system for the grower.

**Breeding of Hardy Apples in Canada** (*Central Experimental Farm, Canada, Bulletin No. 68*).—This bulletin contains an account of the investigations carried out by the Canadian Department of Agriculture as to the breeding of hardy apple trees in the north-western provinces of Manitoba and Saskatchewan.

In 1887 young trees were raised from the seed of a small wild Siberian crab-apple, *Pyrus baccata*, obtained from the Imperial Botanic Gardens, St. Petersburg, and as soon as they were large enough for transplanting were sent to the north-west, where they have since proved entirely hardy, and have fruited abundantly for many years. The fruit, in its unimproved form, however, is not of much use, the apples being not much larger than a cherry, and having an astringent taste. The work of cross-breeding was begun in 1894, in which year efforts were made to improve the size and quality by cross-fertilising the flowers of *P. baccata* with pollen from many of the hardiest and best varieties of apples grown in Ontario. Trees from the seeds of these crosses have been planted from year to year at Ottawa, and various north-western stations. Thirty-six of the cross-bred apples fruited in the fourth year from the sowing of the seed, and since then several hundred more have borne fruit, and the number of varieties worthy of extended cultivation has been considerably increased. Root grafts of some of the more promising sorts were early made, and have also proved hardy. The larger of the new cross-bred varieties are from twelve to fourteen times heavier than *P. baccata*.

Crosses were begun in 1896 on another variety of wild crab, *P. prunifolia*, the fruit of which is about twice the size of *P. baccata*, and in 1902

on the wild apple of Europe, *P. malus*, the fruit of which is about an inch in diameter and of fair quality. The hardiness of both these varieties has been established. Many of the best crosses on *P. baccata* and *P. prunifolia* have been recrossed in the hope of obtaining fruits of larger size and better quality, but there is as yet not much proof that they are sufficiently hardy to endure the climate of the north-west.

A list of the crosses of *P. baccata* and *P. prunifolia* is given in the bulletin, together with the size and quality of the fruit in each case.

## OFFICIAL CIRCULARS AND NOTICES.

### Prevalence of Animal Diseases on the Continent.

The following statement shows that, according to the information in the possession of the Board on June 1st, 1911, certain diseases of animals existed in the countries specified:—

#### *Austria (week ending May 17th).*

Anthrax, Sheep-scab, Swine Erysipelas, Foot and Mouth Disease (166 Höfe).

#### *Belgium (fifteen days ending April 30th).*

Anthrax, Blackleg, Foot-rot, Rabies.

#### *Bulgaria (nine days ending May 7th).*

Blackleg, Glanders and Farcy, Rabies, Sheep-pox, Sheep-scab, Swine-fever.

#### *Denmark (month of April).*

Anthrax, Foot-rot, Swine Erysipelas, Foot and Mouth Disease (one case).

#### *France (month of April).*

Anthrax, Blackleg, Glanders and Farcy, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas, Swine-fever.

Foot and Mouth Disease (216 "étables" in 119 "communes").

#### *Germany (on May 15th).*

Glanders and Farcy, Swine-fever, Foot and Mouth Disease (12,394 infected places in 3,224 parishes).

#### *Holland (month of March).*

Anthrax, Foot-rot, Swine Erysipelas, Foot and Mouth Disease (138 outbreaks in 9 provinces).

#### *Hungary (on May 10th).*

Anthrax, Sheep-scab, Swine Erysipelas, Swine-fever, Foot and Mouth Disease (61 "cours").

#### *Italy (week ending April 2nd).*

Anthrax, Blackleg, Glanders and Farcy, Rabies, Sheep-scab, Swine Erysipelas, Foot and Mouth Disease (1,068 cases entailing 16,408 animals).

#### *Montenegro (sixteen days ending April 15th).*

Foot and Mouth Disease (54 provinces infected entailing 484 animals).

#### *Norway (month of April).*

Anthrax, Blackleg.

#### *Roumania (nine days ending May 13th).*

Anthrax, Dourine, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Swine Erysipelas, Foot and Mouth Disease (4 cases in 1 "commune").



*Russia (month of January).*

Anthrax, Cattle-plague, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Swine Erysipelas, Swine-fever, Foot and Mouth Disease (30,147 cases in 524 "communes").

*Servia (eight days ending May 13th).*

Rabies, Swine-fever, Foot and Mouth Disease (221 cases in 23 "communes").

*Spain (month of March).*

Anthrax, Blackleg, Dourine, Glanders and Farcy, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas, Tuberculosis.

*Sweden (month of April).*

Anthrax, Blackleg, Swine Erysipelas, Swine-fever.

*Switzerland (week ending May 21st).*

Anthrax, Blackleg, Rabies, Swine Erysipelas, Foot and Mouth Disease (46 cases entailing 404 animals, of which 5 cases were declared during the week).

The President of the Board of Agriculture and Fisheries is appointing Committees in each county for the purpose of assisting the Board in all matters pertaining to the encouragement and improvement of the horse-breeding industry. The members of these committees are nominated by the Chairmen and Conveners of the County Councils, and are gentlemen having an intimate acquaintance with the industry of horse-breeding, and with their assistance and co-operation the Board hope to

ascertain in the fullest manner all necessary details as to the character and extent of the industry in the localities which they represent.

The names and addresses of the gentlemen forming the Committees in the following counties were given in the *Journal* for April (p. 58):—Cumberland, Gloucester, Hereford, Isle of Wight, Northampton, Rutland, Salop, E. Sussex, W. Sussex, Staffs, Westmorland, Worcester, Yorks (E. R.), Brecknock, Carmarthen, Denbigh, Monmouth, Radnor, Argyll, Bute, Dumbarton, and Renfrew; and those in the following counties were given in the *Journal* for May (p. 151):—Bedford, Berks, Bucks, Cambridge, Chester, Cornwall, Derby, Devon, Dorset, Durham, Essex, Hants, Hertford, Huntingdon, Isle of Ely, Kent, Lancaster, Leicester, Holland (Lincs.), Kesteven (Lincs.), Lindsey (Lincs.), Middlesex, Norfolk, Northumberland, Nottingham, Oxford, Somerset, East and West Suffolk, Warwick, Wilts, Yorks (W. R.), Yorks (N. R.), Anglesey, Carnarvon, Flint, Merioneth, Montgomery, Pembroke, Aberdeen, Ayr, Banff, Berwicks., Caithness, Clackmannan, Dumfries, Fife, Forfar, Inverness, Lanark, Kincardine, Kirkcudbright, Midlothian and Linlithgow, Nairn, Roxburgh and Selkirk, Shetland, Stirling, and Sutherland. Committees have also been appointed for the following counties:—

**The Soke of Peterborough.**

The Marquess of Exeter, Burghley Estate Office, Stamford.

W. G. Maxwell, Longthorpe, Peterborough.

G. C. Wentworth-Fitzwilliam, Milton, Peterborough.

*Secretary*, Thomas H. Walker, Queen Street, Peterborough.

**Orkney.**

A. Baikie, Hall of Sankerness, near Kirkwall.

J. Clouston, Groemshall, St. Mary's, Holm.

J. Garrioch, Tingwall, Rendall, Kirkwall.

J. Mackay, Stromness Hotel, Stromness.

J. Robertson, Tufta, Harray, Stromness.

Robert Scarth, Binsearth, by Finstown.

A. Skea, Aikerskaill, Deerness, Kirkwall.

J. Wishart, Westquoy, Orphir, Kirkwall.

*Secretary*, Duncan J. Robertson, Clerk to the County Council, Kirkwall.

The Board of Agriculture and Fisheries have received information that the summer stage of American Gooseberry Mildew (*Sphaerotheca Mors uvæ*) was discovered in two Cambridge-shire gardens on May 8th. All gooseberry

**American Gooseberry  
Mildew. Warning.**

growers are advised to examine their bushes carefully, and should any sign of disease be found to spray their bushes with a solution of liver of sulphur (one pound to 32 gallons of water). A leaflet describing the disease and giving directions for dealing with it can be obtained from the Secretary, Board of Agriculture and Fisheries, 4 Whitehall Place, London, S.W., gratis and post free. Letters so addressed need not be stamped.

Growers are reminded that by Article 3 of the American Gooseberry Mildew Order of 1909 they are required to report the presence of this disease on their premises to the Board or the Clerk of the Local Authority for the district, either directly or through an Inspector, and that the failure to report is punishable by a fine.

The Board have addressed the following Circular, dated May 22nd, to County Councils and Councils of County Boroughs in England and Wales, on the subject of the payment of compensation for the termination of a tenancy of land under the Small Holdings Act, 1910:—

**Small Holdings Act.  
Compensation for  
Termination of  
Tenancy.**

SIR,—I am directed by the Board of Agriculture and Fisheries to advert to their circular letter of the 15th August, 1910 (A.189/C)\* as to the procedure to be adopted in dealing with claims for compensation under the above-named Act, and I am to say that the experience which the Board have gained in investigating the claims which have been made under section 2 of the Act has shown that considerable misconception exists as to the scope of the compensation payable under the Act. The Board think it desirable, therefore, to issue some further instructions with the object of securing greater uniformity in dealing with claims.

In view of the fact that any compensation paid by a Council under an award or with the consent or approval of the Board and any expenses which in the opinion of the Board have been necessarily or

\* See *Journal*, September, 1910, p. 496.

reasonably incurred by the Council in relation to a claim are repayable by the Board out of the Small Holdings account, the Board are of opinion that the most convenient course will be that they should take over the work of adjusting the claims, and, failing agreement, of appearing before the Arbitrator. This will enable the officers of the Board to deal with the claims on uniform lines, and will avoid unnecessary duplication of work. The Board think, however, that Councils should continue to be responsible for making the valuation of the goods, implements, produce, and stock proposed to be sold, and that their officers should assist the officers of the Board in the investigation of the claim.

I am, therefore, to ask that a copy of any claim or of any notice of intention to make a claim should be sent to the Board as soon as it is received by the Council, together with information as to whether the notice to quit was given by the Council or by the landlord at the request of the Council. The Board should also be informed of the date on which the tenancy in respect of which the claim is made has terminated or will terminate. The Board will then ask the Council to make a valuation of the goods, implements, &c., proposed to be sold, and after the sale has taken place, to obtain a priced catalogue showing the sums realised. A copy of the valuation and catalogue should then be sent to the Board, who will instruct one of their officers to deal with the claim and to endeavour to arrive at a settlement. If a settlement is effected, the sum payable will be communicated by the Board to the Council, with a request that the Council will pay it and include the amount together with any incidental expenses in their next claim for repayment by the Board. If the claimant refuses to accept the sum offered by the Board, the question will be referred to arbitration, and an officer of the Board will conduct the case before the Arbitrator on behalf of the Council. The sum awarded, together with any costs of the arbitration, will then be paid by the Council and recovered in due course from the Board.

I am to add that although claims under the Act are valid if made within three months of the termination of the tenancy, it is provided by the Act that the tenant must give to the Council a reasonable opportunity of making a valuation of his goods, implements, &c. The Board are advised that this provision refers to such goods, implements, &c., as are proposed to be sold, and that it does not refer to any items in the claim as to which a valuation is not material. Such expenses, therefore, as the costs of removal and the expenses of a sale would be payable in spite of the fact that no opportunity was given for making a valuation.

#### ADAPTATION OF SMALL HOLDINGS.

I take this opportunity of sending, for the information of your Council, copies of instructions\* as to the particulars which should accompany proposals for the adaptation of Small Holdings, which have been drawn up by the Board in consultation with the Local Government Board, and I am to ask that they may be communicated to the officers of your Council, who are responsible for work of the kind.

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\* Not printed.



Compliance with the instructions will save much unnecessary delay. Works of adaptation should not in any case be commenced until the Local Government Board have sanctioned the loan in respect of them.

I am, &c.,

T. H. ELLIOTT,

*Secretary.*

The Board have addressed the following Circular, dated 15th May, 1911, to County Councils and Councils of County Boroughs in England and Wales, with regard to the provision of small holdings :—

**Small Holdings Act.  
Provision of Holdings  
for Unsatisfied  
Applicants.**

SIR.—I am directed by the Board of Agriculture and Fisheries to inform you that they have had under consideration the information supplied by County Councils as to the number of applicants who have been provisionally

approved as suitable for small holdings, but who have not yet been provided with land.

It appears that on the 31st December last 8,168 individuals and 7 associations whose applications for small holdings had been approved had not been supplied with land, and that the estimated quantity of land required for the purpose was 127,256 acres.

The Board are of opinion that the time has come when a special effort must be made to deal with this unsatisfied demand, and for this purpose it is necessary that they should be supplied with full information on the subject in order that they may be in a position to advise as to the steps which should be taken.

The inquiries which the Board have made in certain parts of the country indicate that a considerable number of the unsatisfied applicants have received and refused offers of suitable land which could have been obtained for them on reasonable terms, and that many others are not prepared to pay the rents which would have to be charged for the land they want. In the case of other applicants it has appeared on further investigation that they have insufficient capital to take a holding with any prospect of success. It is the case of the admittedly suitable applicants for whom holdings have not yet been provided which demands special attention at the present time, and the Board propose to increase their staff with a view to assist County Councils to deal promptly and systematically with these cases.

In order that the real extent of the work to be done may be ascertained, the Board would be obliged if you would fill up the enclosed form of Return\* as to the applications received by your Council up to the end of 1910, and also supply a list of the names and addresses of all the unsatisfied approved applicants, stating the date on which they applied, the quantity of land desired, whether or not land has been offered to them by the Council, and adding any other observations which your Council may wish to make. It would be convenient if the list can be arranged according to the parishes and other divisions of the county in which the applicants reside. The Board will then instruct one of their officers to inquire into each application and to report as to the steps that should be taken to deal with it. If it is found that it is imprac-

\* Not printed.

licable to meet the requirements of any particular applicants, the Board will notify the Council accordingly, and suggest that their names should be struck off the list.

The Board feel sure that your Council will recognise the need of dealing without further delay with the outstanding applications, some of which were made over three years ago, and that they will be ready to give the Board their assistance and co-operation in the matter.

The Board will be glad to receive the information asked for not later than the end of this month.

I am, &c.,

T. H. ELLIOTT,

Secretary.

The Agricultural Statistics (Part II.) for 1910 (Cd. 5604, price 5d.) contains the final returns of the produce of crops in Great Britain, with summaries for the United Kingdom. Summaries of these returns have previously appeared in the *Journal*, and were issued in the form of preliminary statements as the particulars became available. The tables in this publication are preceded by a Report by Mr. R. H. Rew, in which various features of the returns are discussed.

### Returns as to the Produce of Crops in Great Britain.

## MISCELLANEOUS NOTES.

**Importation of Plants and Seeds into Chile.**—The Chilean *Diario Oficial* for March 13th contains a Decree providing that plants, fruit and forest trees, shrubs, tubers, bulbs, roots, and vine cuttings shall be examined prior to clearance through the Customs, and, if found diseased, shall be disinfected or otherwise treated. The importation of vine plants with the roots attached is prohibited. Seeds of fruit or forest trees, of decorative and forage plants, and especially of leguminous plants, such as beans, lentils, carobs, lucerne, and clover, shall be subject to similar inspection. It is further provided that the importation of the foregoing articles shall in future only be permitted through the Customs houses of Valparaiso and Talcahuano. (*Board of Trade Journal*, May 4th, 1911.)

**Importation of Plants into Algeria.**—A Decree of April 21st last, published in the *Journal Officiel* of May 1st, prohibits the importation into Algeria of plants of a fibrous nature (other than vines and resinous plants), palms, rooted or otherwise, and the fruit of orange trees, except through the ports of Algiers, Oran, and Bône, and the postal station of Ghardimaou. The plants will be disinfected on arrival.

**Importation of Horses, Cattle, Sheep, Goats, and Swine into France.**—The existing French regulations regarding live stock from Great Britain require a certificate of the Board of Agriculture and Fisheries as to the freedom from disease of the district from which the animals proceed. Intending exporters should therefore send to the Board:—

1. A certificate, signed by a duly qualified Veterinary Surgeon, to the effect that the animal to be exported has been examined, and is apparently free from the following diseases:—

*In the case of Horses.*—Glanders, Farcy, and Dourine.

*In the case of Cattle.*—Foot-and-Mouth Disease and Pleuro-Pneumonia.

*In the case of Sheep and Goats.*—Foot-and-Mouth Disease, Sheep-pox, and Scab.

*In the case of Swine\*.*—Foot-and-Mouth Disease, Swine, Fever, and Swine Erysipelas.

The certificate should give the description and distinctive marks of the animal for purposes of identification, and state that the animal is apparently in good health. It need not be sworn before a Magistrate, and may be signed by any duly qualified Veterinary Surgeon.

2. The name and address of the exporter.

3. The proposed date of exportation.

4. The proposed port of shipment.

5. The name and address of the consignee in France. In the case of horses going to France for a short time only, the name of the place to which they are to be sent will be sufficient.

6. A declaration that the animal has not been exposed to the diseases quoted in paragraph 1, signed by the owner or person in whose charge it has been, (a) in the case of horses going to France temporarily—for the previous month, (b) in the case of other animals—for the previous six weeks. In the latter case it must also be stated where the animal has been during the previous six weeks. The declaration need not be sworn before a Magistrate.

The application, together with the above-mentioned information, should be sent to the Board not more than five days, and not less than one day, before the proposed date of embarkation. Applicants who call at the office should ask for the Intelligence Branch. If the information supplied is in order, the certificate of the Board can, as a rule, be issued on the same day.

**Milk Testing Associations in Canada.**—There has been a rapid rise in recent years in Canada of Associations for testing and recording the milk yield of cows. According to the Canadian

#### Notes on

#### Agriculture Abroad.

*Census and Statistics Monthly* for April, 1911, the Dairy and Cold Storage Branch of the Canadian Department of Agriculture made attempts in 1904 and 1905 to interest farmers in the work by testing cows in Quebec, Ontario, and Prince Edward Island. The first milk-testing association was formed in January, 1906, at Cowansville, Quebec, and by the end of the year 16 associations were at work with over 4,000 cows. This number had grown in 1910 to 167 societies with 11,850 cows tested, and the early months of 1911 saw a further extension of the work by the establishment of "Dairy Record Centres" in Ontario, Quebec, and Prince Edward Island, with an official in charge of each to supervise the regular association work and dispense dairying information.

In these associations members agree to weigh the milk of each cow in the herd night and morning on at least three days every month throughout the entire period of lactation, and to take samples of each of the six milkings. These composite samples are tested once a month at

\* The regulations prohibit the importation of any swine weighing less than 50 kilograms (110 lb.).



the nearest cheese factory or creamery. Members provide themselves with scales, sampling dipper, and one sample bottle for each cow. The Dairy Branch of the Department of Agriculture has so far provided all blank record forms free, together with preservative tablets and sulphuric acid for testing. In addition to this the Department has paid the local makers at the factories for testing each sample every month.

Many members have taken the next step in systematic testing, and are now weighing each milking daily, and recording the weights and kinds of feed consumed. The Department also supplies a small booklet for keeping an account with each cow in the herd.

It is stated that compensation for the time and labour involved in testing and recording is probably soon obtained by the saving of time, labour, and food in the case of animals which are discovered to be not worth their keep. Good herds are built up by the retention of heifers from the best dams and the elimination of worthless animals. Cows are said to be selling for higher prices in consequence of the evidence of their value as milk producers, which is shown by their records.

**Increase in the Productivity of the Sugar Beet in Germany.**—The last forty years have witnessed a remarkable increase in the productivity of the sugar beet in Germany. As will be seen from the following figures, the amount of sugar eventually obtained per acre at the present time is more than double what it was in 1871:—

Period.	Yield of roots per acre. Cwt.	Percentage of sugar extracted.	Net amount of sugar obtained per acre. Cwt.
1871-1876 ... ..	196	8.58	16.8
1876-1881 ... ..	222	8.78	19.6
1881-1886 ... ..	248	10.37	25.7
1886-1891 ... ..	238	12.27	29.2
1891-1896 ... ..	235	12.32	28.9
1896-1901 ... ..	241	13.31	31.9
1901-1906 ... ..	236	14.42	33.9
1906-1911 ... ..	239	15.55	37.1

The yield of roots per acre in 1910-11 was 261 cwt.

Much of this result is due to the improved technical processes now in use in the factories for the extraction of the sugar, but the achievement must also be ascribed in part to improvements in the varieties of sugar beet. Compared with the root of four decades ago, the sugar beet of to-day is more prolific, has a higher sugar content, is much more resistant to the attacks of disease (both of root and leaves), and to climatic changes, and is much more susceptible to the influence of good manuring. The farmer has also contributed much to the success in that he has learnt, partly from his own experience, and partly from the results obtained by scientists, the value of better methods of cultivation. (*Fuhling's Landw. Zeitung*, April 1st, 1911.)

**Opening for Trees and Arboreal Materials in Uruguay.**—The Board have received through the Foreign Office a copy of a memorandum from H.M. Vice-Consul at Montevideo, in which it is stated that the newly-appointed Uruguayan Minister of Industries, Dr. Eduardo Acevedo, is anxious to foster the agricultural development of the country in the direction of tree planting. With this object he intends to organise a competition at which twenty prizes of the total value of about £40,000 will be given for plantations of woods and artificial parks. He has brought in a Bill which will probably be sanctioned,

making it binding on every proprietor of pastoral land to plant five trees for every hectare (equivalent to two trees for every acre). H.M. Vice-Consul is also informed that the Government School of Agronomy will be put in a position to supply trees for those who require them.

British horticultural firms who might wish to supply part of the demand thus created should put themselves in communication with Senor Pablo Varzi, Presidente del Consejo de Administracion y Patronato, Escuela de Agronomia, Montevideo.

The outstanding feature of the weather during May was the unusual warmth experienced over the whole country in the last three weeks.

### Notes on the Weather in May.

This high temperature was in no case accompanied by heavy rainfall, and in the western districts of England and Scotland the fall during the last two weeks was uniformly light.

Notwithstanding the warm weather and lack of heavy rainfall, the amount of bright sunshine recorded varied greatly at different times and in different districts, and in many cases, owing to cloudy conditions, unusual temperature was accompanied by scanty sunshine.

During the *first* week (April 30th to May 6th) the earlier days of the week were more or less rainy over Great Britain generally, but although the conditions over England soon became finer and drier, occasional rain continued in most of the western and northern districts until the end of the week. In England N.E. the rainfall was "light," in England S.E., E., Midland Counties, and in Scotland E. it was "moderate," and elsewhere it was "heavy" or "very heavy." Warmth was everywhere "moderate."

The weather in the *second* week, after being fair to bright very generally during the greater part of the week, became changeable and thundery, at first in the south, and finally in the north also. Some localities, however, experienced neither rain nor thunder. Warmth was "very unusual" except in Scotland N. and E., where it was "unusual"; the excess above the average temperature amounted in several districts to more than 5°, and in Scotland W. to more than 6°. Rainfall in the Midland Counties was "light," and elsewhere "moderate." Bright sunshine was just equal to the average in the Midland Counties and above it in other districts.

At the commencement of the *third* week the weather was rainy over the major portion of Great Britain, but was subsequently mostly dry, though seldom very bright. Taking the week as a whole, the rainfall was "moderate" in England E., N.E., and Scotland E., and "light" in other parts. Warmth, except in Scotland E. and N., was again "unusual." Bright sunshine, on the other hand, was "scanty" in England E., N.E., and Scotland E., and "very scanty" in England S.E. and the Midland Counties.

Generally fair or fine weather was experienced in the *fourth* week, but in nearly every part the conditions were at times unsettled. Thunderstorms, accompanied in many instances by extremely heavy falls of rain, occurred at a few places in the south of England on Thursday, and over a large portion of the country on Friday and Saturday. Temperature still continued "unusual" or "very unusual," and increased during the week. Rainfall was less than the average

in all districts, the fall being very slight in England E. Bright sunshine was more than the average in most districts, but only equal to it in England S.E.

The International Institute of Agriculture, in its Bulletin of Agricultural Statistics for May, 1911, gives the following particulars with regard to the condition of winter-sown cereals on May 1st, 1911, compared with the condition on the corresponding date in 1910:—

**Notes on Crop  
Prospects Abroad.**

Country.	Winter Wheat.		Winter Rye.		Winter Barley.		Winter Oats.	
	May 1st, 1911.	May 1st, 1910.	May 1st, 1911.	May 1st, 1910.	May 1st, 1911.	May 1st, 1910.	May 1st, 1911.	May 1st, 1910.
Belgium ...	105	—	105	—	105	—	—	—
Denmark ...	100·8	97	101·4	97	—	—	—	—
Luxemburg...	102	91	103	98	102	93	102	—
Roumania ...	120	105	120	105	120	103	—	—
Servia ...	100	—	100	—	100	—	100	—
Sweden ...	105	100	97	100	—	—	—	—
Switzerland	99	100	90	95	103	104	—	—
United States	100·1	94·7	100·3	102·1	—	—	—	—
Japan ...	95	103	—	—	95	101	—	—
Tunis ...	120	100	—	—	110	99	115	100

(100 = average of past ten years.)

The following supplementary information is also given:—

*Belgium.*—The period of cold, frost, and drought at the beginning of April, which somewhat retarded vegetation, was followed, at the end of the month, by beneficial rains. Serious damage from field mice is reported from several districts. On May 1st the condition of winter wheat, rye, and oats was good.

*Italy.*—During the first ten days of April cold weather retarded vegetation, without causing any serious damage, however, to the crops. Though there was a lack of moisture during the remainder of the month the condition of winter wheat, rye, barley, and oats was, in general, good, on May 1st.

*Netherlands.*—For several weeks past weather conditions have been very favourable to the development of winter cereals.

*Roumania.*—During the first half of April, the cold weather retarded the vegetation of cereal crops in various parts of the country. During the latter half of the month the weather turned warmer and was favourable to the development of the young plants. On May 1st the condition of wheat, rye, and barley was good.

*Servia.*—Weather conditions are at present favourable, and the condition of the four cereal crops—wheat, rye, barley, and oats—is good.

*Sweden.*—The weather during April and the beginning of May was very favourable to the winter wheat and winter rye crops, and has caused the damage which these crops had suffered from unfavourable weather during the winter almost entirely to disappear.

*Japan.*—The condition of wheat and barley is bad. The falling temperature is unfavourable to the crops.

*Tunis.*—The condition of winter wheat, barley, and oats is excellent.



The following table shows the area sown with spring cereals in various countries :—

Country.	Spring Wheat.		Spring Rye.		Spring Barley.		Spring Oats.	
	Area sown.	Compared with 1910.	Area sown.	Compared with 1910.	Area sown.	Compared with 1910.	Area sown.	Compared with 1910.
	Acres.	Per cent.	Acres.	Per cent.	Acres.	Per cent.	Acres.	Per cent.
Belgium ...	4,940	100	—	—	12,350	100	617,500	100
Denmark ...	—	—	—	—	575,510	100	995,410	100
Ireland ...	—	102	—	100	—	99	—	100
Luxemburg ...	296	105	44	210	2,248	109	77,558	100·7
Switzerland ...	10,374	100	6,175	100	9,633	100	80,522	100

The condition of barley and oats in Denmark on May 1st, 1911, was 98·7 and 99·4 respectively; while the condition of wheat, rye, barley, and oats in Switzerland on that date was 100, 100, 103, and 101 respectively.

The condition of the spring cereals generally was good in Belgium, Italy, and the Netherlands, and the condition in various other countries was as follows :—

*Roumania.*—Spring sowing is now approaching completion. The work has been carried out under normal conditions, and the crops are coming up regularly except in the north, where field work has been delayed by cold. Development has been considerably aided by rain and warm weather since the end of April.

*Russia.*—Spring sowing is late in almost the whole of the black soil belt. In some districts in the south, preparatory work was commenced at the beginning of April, but a spell of cold weather caused an interruption, and work could only be resumed towards the middle of the month.

*Servia.*—Sowing of all the spring cereals is now finished except for maize, which, however, is also approaching completion. The seeds germinated under good conditions, and the young shoots are coming up regularly. The weather was stormy towards the end of April, but did not affect the development of the plants.

*Canada.*—The period of spring sowing is later than usual this year. The rainfall during the present month has, up to the present, been sufficient.

*Russia.*—H.M. Vice-Consul at Nicolaieff, in a dispatch dated May 31st, states that the condition of the winter and spring wheat and barley in the Governments of Kherson, Kharkov, Taurida, Poltava, and Kieff, at the date of the dispatch was, on the whole, good, but rye was not so good. Abundant rains fell in the last week of May. The season was a month late.

Reports in the official *Commercial Gazette* of May 1st to 14th, forwarded by H.M. Commercial Attaché at St. Petersburg, state that the prospects for both winter rye and wheat are medium, and some anxiety prevails in the chief grain-growing regions on account of drought. Wheat has suffered in general much more than rye from the snowless

winter and spring frosts, and more often than rye gives indications inclining to less than average yield. The sowing of spring grain was delayed somewhat in most regions, though accomplished under favourable conditions, but here also the influence of the drought is feared.

An extract from the *Torgovo-Promyshlennaya Gazeta* of May 7th, forwarded by H.M. Consul-General at Odessa (Mr. C. S. Smith), states that the winter crops have hibernated well, so that little resowing will be necessary. As a rule the weather has favoured the preparation of the fields for the spring crops, which, in the southern parts, begin to show well. In most cases the need of rain is becoming urgent. Showers appear to have been only local.

*Germany.*—The report of the Imperial Statistical Bureau gives the conditions of the crops at the beginning of June as follows:—Winter wheat, 2'5; spring wheat, 2'6; winter spelt, 2'5; winter rye, 2'7; spring rye, 2'5; barley, 2'4; oats, 2'6; potatoes 2'6; (2=good, 3=average). The condition of autumn-sown cereals, although on the whole fairly good, varied greatly in different parts of the country, the plants being well forward in some districts, but leaving much to be desired in other districts.

*Austria.*—The Austrian Ministry of Agriculture estimates the condition of the crops in the middle of May as follows:—Wheat, 2'5; rye, 3'1; barley, 2'3; oats, 2'4; maize, 2'1; and potatoes, 2'2; the condition of each crop, except potatoes, being less favourable than at the corresponding date in 1910 (2=above average, 3=average, 4=below average). Wheat had improved since the previous month's report, but rye had suffered more than wheat from the drought. The development of barley and oats is fairly good.

*Fruit Crop in Austria.*—The fruit crop has been very favourably influenced by the fine weather which followed the April frosts. In the southern districts the blossoming was completed by the end of April, but in the northern districts this was only the case with stone fruit. Damage is reported only in districts where the crop is of little importance. (*Statistische Nachrichten*, May 9th, 1911.)

*Roumania.*—A dispatch from H.M. Consul at Bucharest (Mr. Errol MacDonell), dated May 10th, states that spring sowings were delayed by adverse weather during the first half of April, and in many parts barley and oats were only sown late in the month. At the date of the dispatch, however, the spring sowings of early April were already showing above ground. Autumn-sown rye and oats were generally good, though they did not grow much until the latter half of April. Autumn sowings in Mehedinț and Gorj and in the higher lands were not so good, and in the most northern districts the crops were affected by the heavy fall of late snow.

*Canada.*—According to the report of the Canadian Census and Statistics Office the condition of winter wheat in the Dominion at the end of April was 82 per cent. of the normal (81 per cent. in Ontario and 89 per cent. in Alberta). The area reported to be killed during the winter is 21 per cent. The seeding and growing season for the whole of Canada opened late this year, and the month of April was marked by hard frosts. May has been favourable to the cultivation of the land, however, and the rainfall has been sufficient for healthy vegetation. Spring sowings were well advanced in Manitoba, Saskatchewan,

Alberta, and British Columbia, but were backward in the Maritime Provinces. (*Census and Statistics Monthly*, May, 1911.)

*Maize Crop of South Africa.*—The following estimate of the maize crop this year has been received from the South African Trades Commissioner in London :—

	Actual Yield, 1910.	Estimated Yield, 1911.
	Quarters.	Quarters.
Transvaal Province ... ..	1,354,166	1,041,666
Orange Free State Province ... ..	641,666	312,500
Natal Province ... ..	624,999	520,833
	2,620,831	1,874,999

The falling off in the yield is due to the severe drought in these Provinces this season. The maize crop in the Cape Province has been normal, but the quantity produced there is as a rule consumed locally, and will, therefore, not affect the export trade. There is thus likely to be little, if any, maize available for export this year from the Union. (*Board of Trade Journal*, June 1st, 1911.)

*Spain.*—H.M. Consul at Seville (Mr. Arthur Keyser), in a dispatch dated May 26th, states that the corn crop is expected to yield a heavy harvest, the appearance of most of the fields of growing corn being unusually fine. Recent rains have caused pasture to be plentiful, and the sale of stock at all country fairs, now taking place weekly, is far beyond the average. A time of general prosperity is anticipated.

*United States.*—The Crop Reporting Board of the Department of Agriculture estimates the condition of winter wheat on June 1st as 80·4, compared with 80·0 on June 1st, 1910, 80·7 on June 1st, 1909, and 81·6, the average of the past ten years. Preliminary returns of spring wheat make the area sown 20,757,000 acres, or an increase of 4·9 per cent. over last year's area. The average condition of spring wheat on June 1st was 94·6, compared with 92·8 on June 1st, 1910, 95·2 on the same date of 1909, and a ten year average of 93·6. The area under oats shows a decrease of 0·1 per cent., compared with the acreage in 1910, the condition on June 1st being 85·7, against 91·0 on June 1st, 1910. The acreage under barley is about 3 per cent. smaller than that of last year; the condition on June 1st was 90·2, against 89·6 last year. (*Dornbusch*, June 8th, 1911.)

*Argentina.*—A dispatch dated May 4th, from H.M. Chargé d'Affaires at Buenos Aires, states that the drought which prevailed during March was broken early in April by very heavy storms, these extending to the region round Bahia Blanca, which had suffered most severely from the drought. The rain has come too late in the year, however, to benefit pasture land. The mortality in live stock owing to the drought is likely to be felt for some time to come. The soil has been softened sufficiently to allow ploughing, but, for want of grass, horses will be too weak to plough the full extent, and a reduced harvest among the smaller cultivators will be the result. Agricultural prospects generally, however, have risen considerably since the rain.



The Crop Reporters of the Board, in reporting on agricultural conditions on the 1st June, generally state that the crops have done well during May; the first portion of the month was everywhere very beneficial, but the dry weather was lasting too long, and rain is now anxiously looked for. Wheat has

**Crop Conditions  
on June 1st.**

made good progress, and has generally improved, being a strong and healthy plant; still, however, with the same exceptions of patches sown late in the autumn. Barley and oats are also both doing well, but now stand in need of rain, especially the oats, which are perhaps the less satisfactory of the two. Some fields of barley are looking yellow owing to the dry weather. The total area under barley would seem to be slightly less than last year, that under oats being slightly greater; so that the total acreage under cereals in Great Britain would seem to be somewhat larger than in 1910. Beans and peas are generally doing well, though the former are mostly short in the haulm.

Potatoes are generally coming up well; here and there some early pieces have been damaged by frost. The area under this crop is estimated to be a few thousand acres above that of last year.

Mangolds are generally fairly satisfactory, although, like everything else, they stand in need of rain. Turnip-sowing, in many districts in the south, had hardly commenced, the land being too dry, and this operation was generally backward. In the north, on the other hand, and particularly in Scotland, turnip-sowing was much more advanced than usual. Where the plants were up, they had been very generally attacked by the fly, and, failing rain (which is, of course, everywhere required), much re-sowing will be necessary.

"Seeds" hay promises rather better than meadow hay, although reports from different districts vary considerably. In Norfolk, Lincoln, the East Riding, and parts of the South-West of England and in Wales, few crops are reported to be above average, but elsewhere, and especially in Scotland, abundant crops prevail. Representing an average crop in Great Britain by 100, the yield of "seeds" hay in 1911 will probably be represented by a percentage of 102, that of hay from permanent grass by 101; but while many districts will give a much higher yield, many others will have poorer results.

Large crops of strawberries and currants, good crops of raspberries, and a fair (though very variable) yield of gooseberries, are indicated from nearly all districts, the principal exceptions coming from Worcester. Apples and cherries generally promise to be abundant, though the latter are under average in Kent; plums should also be a large crop (with the important exception of the Worcester district), and pears above average. Generally there is much blight on the fruit trees, and washing is being done on a considerable scale.

The area under hops is probably four or five per cent. less than in 1910, though the Kent acreage will probably be nearly maintained. The plant is growing well, and has made rapid growth, looking strong. It has already been very generally attacked by vermin, and washing is general.

Pastures, until towards the end of the month, were very full of grass, but the drought is beginning to tell upon them, and they are mostly beginning to get bare, although several reports still state that

there was more upon them than usual at the date of these reports. Live stock have thriven well during the month.

The Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based on returns from correspondents in various districts, on the demand

**Agricultural Labour** for agricultural labour in May :—

**in England**

**during May.**

The dry weather which prevailed during the greater part of May enabled farm work to proceed with little or no interruption. In a few cases the weather, by checking the growth of weeds, lessened the demand for extra labourers for hoeing and weeding, but generally such work, and sowing potatoes and roots, carting manure, &c., provided a good deal of employment for extra men, and the supply of labourers was about equalled by the demand. Men for permanent situations, particularly for work like milking, where Sunday labour is required, were reported as scarce in several districts.

*Northern Counties.*—Employment in these counties was generally regular throughout the month. The supply of extra labourers was about equal to the demand, which was fairly good, on account of such work as sowing root crops, carting manure, and hoeing corn. No change in wages was reported at the May hirings for single male farm servants in *Northumberland*. Men for permanent situations were in good demand in several districts in the *West Riding of Yorkshire*.

*Midland Counties.*—Hoeing and weeding, carting manure, planting potatoes and roots, and threshing provided a good deal of employment for extra labourers, and the supply of and demand for these men were as a rule about equal, though in a few districts employment was a little slack towards the end of the month, on account of the prolonged dry weather. A scarcity of men for permanent situations was reported in several districts in *Worcestershire* and *Oxfordshire*.

*Eastern Counties.*—There was a good demand for extra labourers in these counties, principally for hoeing and weeding, and, while the supply of men was generally sufficient, there was some scarcity in several districts, including the *Spilsby (Lincolnshire)*, *East and West Flegg*, and *Swaffham (Norfolk)* Rural Districts. Little or no change was reported in men's wages at the May hiring fairs in *Lincolnshire*.

*Southern and South-Western Counties.*—Extra labourers were in fairly good demand on the whole in these counties, though several correspondents mentioned that the demand was lessened by the dry weather, less hoeing than usual being required; the supply of men was generally about equal to the demand. A scarcity of permanent men, especially milkers, was reported in several districts in *Sussex*, and in the *Godstone (Surrey)*, *Chippenham (Wiltshire)*, *Hereford*, and *Stow-on-the-Wold (Gloucestershire)* Rural Districts.

## THE CORN MARKETS IN MAY.

C. KAINS-JACKSON.

Business in grain was active during almost three weeks of May, but the continued fine weather exerted its influence before the end of the month, which closed with market tendencies favouring the buyer.

*Wheat.*—Owing to the exhaustion of stocks of home-grown grain, natural at this season, the prices obtainable at the country markets have shown some improvement, generally about a shilling on the month, and in some cases two shillings. The best East Kent white fluffs made later in May 37s. per 504 lb., 35s. was paid for sound Norfolk red, and 33s. 6d. made for Essex rivetts. Even poultry wheat was held for 32s. per 480 lb., 30s. being also paid for light, or 448 lb. lots.

Australian wheat has shown remarkable intrinsic strength in view of the 1,500,000 qr. which are now on passage. This is a large quantity, and its mean quality is not extremely high. The price is about 37s. Canadian wheat, on the other hand, has been the subject of a "slump," and against 38s. 6d. on the last day of April, 37s. 3d. was accepted on May 31st. This relates to top grade, the decline on other sorts being proportionate. At Liverpool on the 31st a cargo of the best Manitoba was offered at 34s. 3d. for prompt shipment, a price which, after making allowance for landing charges and market profit, argues a further 1s. spot decline, or 36s. 3d. against 37s. 3d. The depreciation of the very valuable Canadian product appears to be due to the large area sown for the 1911 crop, the good promise shown by that area at the end of May, and the consequent readiness of Canadian farmers and owners of wheat in elevator to sell out their 1910 wheat previously held very firmly. Russian wheat is not cheaper on the month, 32s. to 36s. being the ordinary range. Indian wheat tended to decline a little, but, the shipments being moderate, there was no pressure to sell.

The shipments of the month were 677,000 qr. from North America, 1,395,000 qr. from South America, 2,712,000 qr. from Russia, 424,000 qr. from Europe S.E., 365,000 qr. from India, and 549,000 qr. from Australasia. The Russian shipments were extremely heavy, but only 300,000 qr. are on passage to the United Kingdom, and the Continental inquiry has been much above the average. The French and Italian crops promise a better yield this season, but it will not be before the beginning of August that new crop deliveries will be large enough to meet current market wants. Meanwhile Russia is playing the chief part in making up the deficiency.

The total shipments of breadstuffs for ten months of the shipping year, August 1st to May 31st, were 61,460,000 qr., against 52,100,000 qr. last season, but estimated imports of breadstuffs into the United Kingdom for the same period were about 750,000 qr. less than previously. The increase in the Continental demand therefore is seen to have been about 10,110,000 qr. The quantity of wheat on passage at the end of the month was 3,510,000 qr., or decidedly less than at the like date last year. It includes a relative excess of white sorts, so that spot holders of red are in a stronger position than holders of the former.



The progress made by the young wheat during May was regarded, on market advices, as very good, not only in Great Britain, but also in France, the United States, and Russia.

*Flour.*—The top-price has been stationary at 31s. all through the month, nor have either Household or Country sorts undergone any material fluctuations. Hungarian is 2s. dearer, but this rise is common in May or June, the old crop flour getting used up, and value appreciating pending new crop flour being put on sale in the early autumn. American offers for June and July shipment came on the 31st at rates which were depressing to the spot market. There were, however, only 190,000 sacks of foreign flour on passage, and stocks in hand are moderate.

*Barley.*—Supplies of British have become very small, and the averages are consequently regarded as more or less deceptive. The reduced supply of foreign on passage at the end of April appeared likely to cause prices to advance in May. This probability was realised, and the cheapest, Russian, closed fully 1s. dearer on the month. The supply on passage has not been augmented, and closed at 315,000 qr., including malting as well as feeding. The shipments were 90,000 qr. of brewing from California, 2,357,000 qr. of feeding from Russia, and 140,000 qr., mostly feeding, but some brewing, from Europe S.E. and Anatolia. The large Russian shipments were nearly all taken by different Continental ports.

*Oats.*—British averages show a general improvement on the month, and the price of imported oats has been well maintained, despite the weather being against a large use of this feeding stuff. The rival shippers—Russia and Argentina—sent off respectively 917,000 qr. and 354,000 qr. Argentina fell considerably below expectation in her exports. The supply on passage on 31st was 575,000 qr., as compared with 310,000 qr. a year ago. Stocks of oats in British granaries are reduced, however, so that the extra 265,000 qr. are not expected to cause depression on arrival.

*Maize.*—Unusually good shipments of round (353,000 qr. from Russia and 691,000 qr. from Europe S.E.) have continued to be reported, but America only sent off 260,000 qr. of flat and mixed corn, and Argentina had no yellow to ship. South Africa appears unable to accept the British orders for supply; the South African maize is appreciated in this country, but there is seldom much freedom in offerings, and during May inability to promise supplies has been repeatedly cabled in reply to inquiries. Burma is stepping in to some extent with offers to ship at five guineas per ton c.f.i. to London. This is 22s. 6d. per 480 lb., the ordinary selling unit in England. America has greatly surprised the trade by the smallness of her shipments. May imports of maize were the smallest monthly total since April, 1908, and the position of holders has gained in strength during the month. The supply on passage on 31st, 420,000 qr., was very moderate.

*Oilseeds.*—The quantity of linseed on passage has increased during the month from 172,000 to 244,000 qr., while that of cottonseed has fallen from 30,000 to 21,000 tons. The increase in the prospective supply of linseed is satisfactory to the extent that it goes, but how small that extent really is may be gathered from the returns of exports from all countries since January 1st. For the first five months of the year the

figures are:—1911, 2,360,000 qr.; 1910, 3,115,000 qr.; 1909, 4,070,000 qr. While this percentage of difference prevails it is manifestly unreasonable to look for anything like cheap linseed, nor while the chief oilseed is dear is there much chance of other kinds being other than dear also. At the present moment the best bargains, based on the analyst's tables of oil and other contents in proportion to the price, are sunflowerseed and sunflowerseed cake; 14s. per cwt. is being asked for the seed. Sunflowerseed cake is not much known in England, but is largely used in Russia. The British farmer with stock to fatten might apparently do well to study the possibilities of this cake. Linseed at the close of May was quoted at 17s. to 18s. per cwt., Egyptian cottonseed at 8s. 3d. to 8s. 6d. per cwt.

*Various.*—Of the staples usually referred to under this heading soy beans are rather cheaper on the month, beet-sugar, rice, and canaryseed unchanged. Indian chick peas at 5s. per cwt. are excellent feeding value. Many prefer to buy them in the split form at 8s. 6d. per 160 lb. bag.

## THE LIVE AND DEAD MEAT TRADE IN MAY.

A. T. MATTHEWS.

*Fat Cattle.*—It was fully expected that, as the end of the stall-feeding season approached, there would be a considerable advance in the value of British beef, but these hopes have thus far been disappointed. There has indeed been a small improvement, but only to the extent of 1d. to 1½d. per stone of 14 lb., while it would require as much as that per lb. to meet the views of feeders, and to justify the present cost of stores. The following list of average prices in the English markets shows at a glance the extent of the upward movement that has taken place as compared with April values:—Shorthorns, for the three qualities as classified in the official returns:—8s. 4½d., 7s. 8½d., and 6s. 8d. per stone, against 8s. 3½d., 7s. 7d., and 6s. 6½d.; Herefords, first quality, 8s. 6½d., second, 7s. 11d., against 8s. 6d. and 7s. 11d.; Devons, 8s. 7d. and 7s. 9½d., against 8s. 5½d. and 7s. 8½d.; and Scots, 8s. 6d. and 7s. 11½d., against 8s. 4½d. and 8s.

One noteworthy feature of the month's trading was the higher prices prevailing in several of the southern markets compared with those of the north. In the week ending the 18th, 8s. 9d. per stone was made for prime Shorthorns at Basingstoke, Dorchester, and Newport, while at Shrewsbury the top price was 7s. 7d., and at Leeds and Liverpool, 8s. 2d. London also, in that week, only quoted 8s. 2d. Islington prices have been well above the average during the spring months prior to May, but are now considerably below it. Scottish markets have been less strong than the English, for cattle, for the last few weeks.

*Veal Calves.*—There has been a fair demand for first quality fat calves, but more of the second class have been on offer as usual at this season, and the average price of both in about twenty British markets declined ¼d. per lb., as against that of April. Prices were fairly even, and the average was 9d. and 8d. per lb.

*Fat Sheep.*—Sheep sold in the wool during May were comparatively very few, and may be ignored in the quotations of prices. The following averages are therefore confined to clipped sheep:—Downs, in about twenty English markets, averaged  $7\frac{1}{4}d.$  per lb., and a fraction over for first quality;  $6\frac{3}{4}d.$  for second, and  $5\frac{1}{2}d.$  for third quality. This was fully  $\frac{1}{4}d.$  per lb. more than the April average. Prime small Longwools averaged  $6\frac{3}{4}d.$ ,  $6d.$ , and  $5d.$ , also showing a farthing advance on first and third quality. In the last week there were very variable prices quoted in different markets. The best Downs fetched  $8\frac{1}{2}d.$  per lb. at Derby, and  $8\frac{1}{4}d.$  at Islington, while at Leeds and York they were quoted at  $6\frac{3}{4}d.$  At Hull, Longwoolled ewes (clipped) were sold at the very low figure of  $3\frac{3}{4}d.$  per lb. In the same week Cheviots, also clipped, made  $8\frac{1}{4}d.$  per lb. at Preston, Liverpool, and Salford. At the end of the month there was a rather sharp advance in lightweight sheep, first quality advancing fully  $\frac{1}{2}d.$  per lb. at London, but this did not extend to heavier sheep, which were difficult of sale.

*Fat Lambs.*—The trade in fat lambs forms a very important section of the business in live stock at this season, and official quotations were given in May for nearly forty British markets. The decline in the average price of  $1d.$  per lb. in May means little, as naturally the size of the lambs has greatly increased. The general British average was  $11\frac{1}{2}d.$  and  $10d.$  per lb., against  $12\frac{1}{2}d.$  and  $11d.$  in April. The London trade showed a slight relative improvement, but still remained about  $\frac{1}{2}d.$  per lb. below the general average price. Newcastle and Preston were quoted up to  $1s.$  per lb. at the last May markets, while the highest London price was  $10\frac{1}{2}d.$

*Fat Pigs.*—The value of fat pigs gradually and steadily declined all the month, and the average prices were only  $6s.$   $11d.$  and  $6s.$   $3\frac{1}{2}d.$  per stone, against  $7s.$   $3\frac{1}{4}d.$  and  $6s.$   $7\frac{1}{2}d.$  in April. As in August last the average for prime bacon pigs once touched  $8s.$   $3d.$ , it can scarcely be said that the fall is due to the time of year and warm weather.

*Carcass Beef—British.*—In the London Central Market Scotch beef was fairly supplied, and trade was firm, except in the third week, when prices declined  $\frac{1}{4}d.$  per lb. The average value of both Scotch and English beef differed very slightly from that of April. It was  $6\frac{1}{2}d.$  to  $6\frac{3}{4}d.$  for Scotch whole sides, and  $5\frac{3}{4}d.$  to  $6\frac{1}{2}d.$  for English. The latter beef was very poorly supplied.

*Port-Killed Beef.*—There were rather larger supplies, and average prices for Deptford-killed beef were a shade better than in April, and at  $5\frac{5}{8}d.$  to  $6d.$  per lb. very nearly equalled those of English.

*Chilled Beef.*—States beef was rather more in evidence than in April, and best hindquarters fetched an average of about  $6\frac{1}{4}d.$  per lb., and best fores from  $3\frac{3}{4}d.$  to  $4\frac{1}{4}d.$  Argentine chilled was very abundant, and, as usual, the trade in it was fluctuating and uncertain. On some days vendors quoted very variably, and fair averages were difficult to obtain. As near as can be calculated, best hindquarters averaged during the month  $4\frac{1}{2}d.$ , and best fores  $3d.$  per lb. The changes in the weather greatly influenced the trade in this article.

*Frozen Beef.*—A very quiet trade was passing in "hard" beef, and at times transactions were little more than nominal. Best hindquarters averaged about  $3\frac{3}{4}d.$ , and forequarters  $2\frac{3}{4}d.$  per lb.

*Carcass Mutton—Fresh-Killed.*—There were very good supplies of



Scotch mutton, but the very small sizes that fetch fancy prices became very scarce, and hardly quotable. Those on offer sold at 8d. to 8½d. per lb. The ordinary run of best Scotch were 48 lb. carcasses, and these varied from 7d. to 7½d. per lb. An offer of 10d. per lb. was made for 1,000 of these carcasses for export to the Continent, but was refused. English tegs made from 6d. to 6¾d. per lb.

*Frozen Mutton.*—This trade was much depressed, especially for heavy sheep, and April prices of 3d. to 3¼d. per lb. were not exceeded till the last week, when an advance of ¼d. per lb. was established.

*Carcass Lamb.*—British lamb sold at moderate prices all the month, the average price being 10d. and 9d. per lb. for first and second quality, but large quantities were sold at little more than mutton prices. Frozen lamb was also very cheap. The finest Canterbury did not exceed 4¾d. till the last week, when it advanced to 5d. per lb.

*Veal.*—There was little change in the value of English and Dutch veal from that of April; the best fetched 8½d. per lb. at Smithfield, with lower qualities ranging down to 5d.

*Pork.*—There is always a limited summer demand for pork in London, but supplies were too heavy in May, and in the third week 6d. per lb. was the top price, but smaller consignments in the last week caused the value to advance ½d. per lb.

## THE PROVISION TRADE IN MAY.

HEDLEY STEVENS.

*Bacon.*—During the month of May, especially during the latter half, there was a much improved demand for all classes of bacon and hams. Prices early in the month were lower, and there was some accumulation of stock, brought about by the much larger arrivals, especially from the United States of America, Canada, and Russia, but towards the close of the month prices had hardened considerably.

About the middle of May the best Russian sides were selling at about 44s. per cwt., and best Canadian at 49s. to 56s. per cwt. These comparatively low prices materially improved the volume of trade, but the conditions did not last long, and by the end of the month some brands of both descriptions had advanced 6s. to 7s. per cwt. The warmer weather was doubtless the chief factor in bringing about the higher prices, having improved the consumption of all cured meats, especially hams. Some American hams showed advances on the month of from 6s. to 7s. per cwt. For the lighter weights, which continue scarce, still higher prices must be expected, although this greatly depends on the weather conditions.

The shipments of bacon and hams from the United States and Canada for the month of May show about 55 per cent. increase over last year, and this increase is likely to be maintained. Hogs continue to be marketed in America in larger quantities, but with the reported improved home consumption of bacon and hams, prices are on the whole higher, both for the raw and manufactured article. Prices for hogs at Chicago during May ranged from \$5.35 to \$6.40, against \$9.20 to \$9.80 in May, 1910, and \$6.75 to \$7.45 two years ago.

English pigs were marketed more freely, and prices are now easier all round, although porkers were scarce.

*Cheese.*—The expectation that prices for old cheese during May would be considerably higher was not realised; in fact, the reverse happened, all descriptions of imported cheese being cheaper on the month. Country buyers were very stubborn, and refused to operate except from hand to mouth; in order to force business, therefore, some holders steadily reduced their prices on both Canadian and New Zealand makes. The paucity of the demand for both of these descriptions is attributed by some to the fact that retailers did not reduce their prices in line with wholesale values, while others say it is on account of the quantity of really fine ripe States cheese on offer, and which have gone into consumption at the lower prices at which they were quoted.

The demand for fodder cheese this season has been smaller than for some years past, and really best Canadians of this description were selling towards the end of the month at about 51s. to 52s. c.i.f. The May make in Canada was less than last year on account of the backward season, but a very large make is expected during the month of June, on account of the good condition of the cows and the excellent prospects of the pastures.

A fair quantity of the May make of Northern States cheese was offered by cable at prices in line with Canadians. Until recently these goods have been required for home consumption at prices considerably above those current in Canada.

At the end of the month the estimated stock of Canadian cheese at the three principal distributing centres (London, Liverpool, and Bristol) were 65,000, against 99,000 at the same time last year, and 63,000 two years ago. The stock of New Zealand cheese was 26,000 crates in London and Bristol, against 32,000 last year.

Stocks of last season's English cheese are now in very small compass, smaller than for two seasons back. It is difficult to obtain reliable information, but probably the May make has been under the average, there having been a large demand for milk.

*Butter.*—The demand for butter was again disappointing, and it is reported that large quantities of Australian were put into cold store during the month. The arrivals from New Zealand were small, and for the most part found ready buyers on arrival. On the month prices show a drop of from 2s. to 5s. Most of the business was again in best selections.

The arrivals from Australia will continue large for the whole of next month, and probably throughout the summer. Siberian arrived in increased quantities, and the quality was very satisfactory. A large make of Irish butter is in progress, and tinning operations were in full swing at the end of the month.

*Eggs.*—The demand for fresh-laid eggs was good, and a fair quantity was stored for future use. Arrivals from Russia for the month were large, and prices favoured buyers, the warmer weather decreasing the consumption of this class of goods.

## PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and SCOTLAND  
in the Month of May, 1911.

(Compiled from Reports received from the Board's Market  
Reporters.)

Description.	ENGLAND.		SCOTLAND.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
<b>FAT STOCK:—</b>	per stone.*	per stone.*	per cwt.†	per cwt.†
Cattle:—	s. d.	s. d.	s. d.	s. d.
Polled Scots ... ..	8 6	8 0	39 11	37 0
Herefords ... ..	8 6	7 9	—	—
Shorthorns ... ..	8 4	7 8	38 9	36 4
Devons ... ..	8 7	7 10	—	—
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	d.	d.	d.
Veal Calves ... ..	9	8	8½	7½
<b>Sheep:—</b>				
Downs ... ..	7½	6¾	—	—
Longwools ... ..	7	6¼	—	—
Cheviots ... ..	8¾	8	8½	7½
Blackfaced ... ..	8½	7¾	7¾	7
Cross-breds ... ..	7¾	6¾	8½	7½
	per stone.*	per stone.*	per stone.*	per stone.*
	s. d.	s. d.	s. d.	s. d.
Pigs:—				
Bacon Pigs ... ..	6 11	6 5	7 1	6 0
Porkers ... ..	7 5	6 11	7 5	6 6
<b>LEAN STOCK:—</b>	per head.	per head.	per head.	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	22 2	18 13	22 0	18 2
„ —Calvers... ..	20 19	18 13	19 12	17 3
Other Breeds—In Milk ...	19 9	16 4	19 1	16 5
„ —Calvers ... ..	14 15	13 7	19 4	16 11
Calves for Rearing ... ..	2 8	1 16	2 18	2 2
<b>Store Cattle:—</b>				
Shorthorns—Yearlings ...	10 19	9 8	11 11	9 13
„ —Two-year-olds... ..	15 6	13 7	15 18	13 15
„ —Three-year-olds ...	18 16	17 2	17 18	15 14
Polled Scots—Two-year-olds	—	—	17 12	15 5
Herefords— „	16 12	14 18	—	—
Devons— „	15 4	13 9	—	—
<b>Store Sheep:—</b>				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	44 3	37 0	—	—
Scotch Cross-breds ... ..	—	—	37 2	32 11
<b>Store Pigs:—</b>				
8 to 10 weeks old ... ..	22 0	17 11	24 10	20 1
12 to 16 weeks old ... ..	31 9	25 2	36 0	27 9

\* Estimated carcass weight.

† Live weight.



AVERAGE PRICES of DEAD MEAT at certain MARKETS in  
ENGLAND and SCOTLAND in the Month of May, 1911.

(Compiled from Reports received from the Board's Market  
Reporters.)

Description.	Quality.	Birming- ham.	Liver- pool.	Lon- don.	Man- chester.	Edin- burgh.	Glas- gow.
		per cwt. <i>s. d.</i>	per cwt. <i>s. d.</i>	per cwt. <i>s. d.</i>	per cwt. <i>s. d.</i>	per cwt. <i>s. d.</i>	per cwt. <i>s. d.</i>
BEEF :—							
English ... ..	1st	55 6	56 6	56 6	56 6	55 6*	56 6*
	2nd	52 0	52 0	54 6	53 6	51 0*	54 0*
Cow and Bull ... ..	1st	49 6	48 6	46 6	49 0	48 6	48 6
	2nd	43 0	41 0	42 0	45 0	39 6	42 6
U.S.A. and Cana- dian :—							
Port Killed ... ..	1st	55 0	56 6	55 0	56 0	—	55 0
	2nd	51 6	52 0	52 6	53 6	—	52 6
Argentine Frozen—							
Hind Quarters...	1st	36 0	36 0	36 0	36 0	36 0	36 0
Fore „ „	1st	27 0	27 0	25 6	27 0	26 6	27 0
Argentine Chilled—							
Hind Quarters...	1st	43 0	39 6	42 6	40 0	42 0	42 6
Fore „ „	1st	29 0	28 0	26 6	28 0	28 0	28 0
Australian Frozen—							
Hind Quarters...	1st	35 6	34 6	36 0	34 6	—	33 0
Fore „ „	1st	27 0	24 6	25 6	24 6	—	25 0
VEAL :—							
British ... ..	1st	71 6	75 0	76 6	74 0	—	—
	2nd	57 0	70 0	65 6	69 0	—	—
Foreign ... ..	1st	—	—	76 6	—	74 6	—
MUTTON :—							
Scotch ... ..	1st	—	76 0	72 6	77 6	63 6	70 6
	2nd	—	70 6	64 6	72 6	52 6	61 0
English ... ..	1st	62 6	67 6	61 0	70 0	—	—
	2nd	55 0	57 6	56 6	63 0	—	—
Argentine Frozen ...	1st	29 6	28 6	28 6	28 0	27 0	28 0
Australian „ „	1st	28 6	25 0	26 6	25 0	—	26 0
New Zealand „ „	1st	—	25 6	31 0	25 6	—	28 6
LAMB :—							
British ... ..	1st	—	95 6	93 6	97 0	93 6	107 6
	2nd	88 6	86 6	85 0	87 6	81 6	93 6
New Zealand ... ..	1st	48 6	44 6	45 0	44 6	49 6	48 6
Australian ... ..	1st	38 0	35 0	36 6	35 6	35 0	36 0
Argentine ... ..	1st	38 0	36 0	36 6	36 0	—	35 6
PORK :—							
British ... ..	1st	66 6	65 6	60 6	65 6	56 6	59 6
	2nd	59 6	57 0	56 0	60 6	51 6	55 6
Foreign ... ..	1st	—	—	57 6	—	—	—

\* Scotch.

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882. in each Week in 1909, 1910 and 1911.

Weeks ended ( <i>in</i> 1911).	WHEAT.						BARLEY.						OATS.					
	1909.		1910.		1911.		1909.		1910.		1911.		1909.		1910.		1911.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 7 ...	32	9	33	6	30	5	26	11	24	11	23	11	17	5	17	2	17	0
" 14 ...	32	8	33	8	30	8	27	1	24	11	23	10	17	5	17	7	17	2
" 21 ...	33	2	33	9	30	11	27	3	24	11	24	4	17	8	17	6	17	4
" 28 ...	33	0	33	6	30	11	27	6	25	0	24	5	17	9	17	4	17	3
Feb. 4 ...	33	4	33	7	30	9	27	7	24	10	24	5	17	10	17	7	17	5
" 11 ...	33	8	33	4	30	5	27	8	24	9	24	6	17	11	17	11	17	5
" 18 ...	34	1	33	0	30	3	27	11	24	6	24	7	18	0	18	0	17	6
" 25 ...	34	5	32	7	30	2	28	0	24	2	24	9	18	0	17	10	17	7
Mar. 4 ...	34	10	32	7	30	0	27	11	24	6	25	0	18	2	18	1	17	5
" 11 ...	35	8	32	6	30	1	28	4	24	1	25	0	18	2	18	0	17	5
" 18 ...	35	9	32	6	30	1	28	0	23	6	24	11	18	5	18	0	17	6
" 25 ...	36	0	32	9	30	2	28	0	23	7	25	0	18	6	17	11	17	5
Apl. 1 ...	36	5	33	0	30	3	27	10	23	8	24	11	18	8	18	0	17	5
" 8 ...	37	4	33	6	30	4	28	0	23	1	24	7	18	10	17	11	17	7
" 15 ...	38	7	33	7	30	3	27	8	23	5	25	2	19	2	18	3	18	3
" 22 ...	41	4	33	7	30	4	28	2	23	0	25	5	19	9	18	3	17	10
" 29 ...	42	5	33	0	30	11	27	10	22	10	25	5	20	0	18	3	18	3
May 6 ...	40	9	32	6	31	4	27	7	22	7	25	7	20	3	18	2	18	6
" 13 ...	41	6	32	1	31	8	27	3	22	0	25	1	20	6	18	1	19	0
" 20 ...	42	8	31	10	32	6	27	0	21	8	25	4	20	11	17	8	19	2
" 27 ...	42	6	31	3	32	8	26	3	21	4	25	0	21	0	17	10	19	5
June 3 ...	43	1	30	2	32	5	25	7	21	8	24	10	21	3	17	10	19	5
" 10 ...	42	11	29	1	32	4	26	10	20	9	25	7	21	4	17	10	19	7
" 17 ...	42	7	29	0			26	10	18	11			21	6	18	0		
" 24 ...	42	8	29	4			27	2	20	1			21	7	17	9		
July 1 ...	42	9	29	9			27	2	19	11			21	9	17	7		
" 8 ...	43	0	30	4			26	4	19	5			21	8	17	4		
" 15 ...	43	3	31	1			26	10	21	3			21	9	17	7		
" 22 ...	44	0	31	11			27	4	19	9			22	5	17	5		
" 29 ...	43	5	33	5			24	6	20	10			22	2	18	1		
Aug. 5 ...	44	9	33	9			27	4	20	5			22	11	18	3		
" 12 ...	44	9	33	5			24	9	20	4			21	8	18	0		
" 19 ...	41	6	32	11			23	11	20	11			19	8	17	11		
" 26 ...	38	5	32	7			24	7	20	10			19	4	17	2		
Sept. 2 ...	37	2	32	2			26	3	22	10			19	6	17	2		
" 9 ...	34	11	31	11			26	1	23	3			18	5	17	2		
" 16 ...	33	6	30	11			26	5	24	3			17	9	16	6		
" 23 ...	32	9	30	2			26	8	24	2			17	7	16	3		
" 30 ...	32	2	30	1			26	9	24	4			17	2	16	4		
Oct. 7 ...	31	8	30	1			26	9	24	7			17	0	16	3		
" 14 ...	31	4	30	2			27	0	25	1			17	0	16	2		
" 21 ...	31	8	30	4			27	7	25	3			16	11	16	1		
" 28 ...	31	10	30	4			27	9	25	4			17	0	16	2		
Nov. 4 ...	32	5	30	4			27	9	25	6			17	0	16	2		
" 11 ...	32	5	29	11			27	7	25	4			17	1	15	11		
" 18 ...	32	7	29	8			27	0	25	1			17	4	16	1		
" 25 ...	33	0	29	11			26	8	24	10			17	3	16	4		
Dec. 2 ...	33	3	30	6			26	1	24	7			17	4	16	7		
" 9 ...	33	3	30	9			25	7	24	3			17	3	16	9		
" 16 ...	33	2	30	7			25	3	23	9			17	4	16	10		
" 23 ...	33	1	30	7			25	2	23	10			17	4	16	9		
" 30 ...	33	3	30	5			25	1	23	9			17	4	16	9		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

AVERAGE PRICES of **Wheat, Barley, and Oats** per Imperial Quarter in **FRANCE, BELGIUM, and GERMANY**, and at **PARIS, BERLIN, and BRESLAU**.

	WHEAT.		BARLEY.		OATS.	
	1910.	1911.	1910.	1911.	1910.	1911.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
France: April	42 2	45 11	25 11	26 6	21 10	21 11
May	42 1	46 9	25 9	27 2	21 10	22 8
Paris: April	43 0	46 1	24 8	24 8	22 1	23 4
May	44 0	49 3	24 8	25 7	22 3	23 11
Belgium: March	35 10	32 5	23 10	24 7	19 8	19 8
April	35 11	32 10	23 1	24 7	19 10	20 8
Germany: March	45 7	40 6	25 9	29 0	21 3	22 3
April	46 7	40 7	25 9	29 6	21 0	23 1
Berlin: March	48 0	42 6	—	—	22 5	21 8
April	48 3	42 10	—	—	21 11	22 3
Breslau: March	44 8	37 10	25 4 <sup>*</sup> 24 2 <sup>†</sup>	27 7 <sup>*</sup> 22 11 <sup>†</sup>	19 11	20 1
April	44 10	38 1	25 4 <sup>*</sup> 24 2 <sup>†</sup>	27 7 <sup>*</sup> 23 7 <sup>†</sup>	20 0	20 11

\* Brewing.

† Other.

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the Belgian quotations are the official monthly averages published in the *Moniteur Belge*; the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

AVERAGE PRICES of **British Wheat, Barley, and Oats** at certain Markets during the Month of May, 1910 and 1911.

	WHEAT.		BARLEY.		OATS.	
	1910.	1911.	1910.	1911.	1910.	1911.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
London... ..	32 4	33 4	20 2	25 4	19 3	20 4
Norwich " " "	32 0	31 10	23 1	23 3	17 4	18 8
Peterborough " " "	30 7	31 11	21 0	24 6	17 3	18 10
Lincoln... ..	31 8	31 5	20 3	23 6	19 3	19 6
Doncaster " " "	31 11	31 2	23 8	25 0	18 2	19 0
Salisbury " " "	31 9	31 10	23 0	23 4	17 11	18 9



AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain MARKETS in ENGLAND in the Month of May, 1911.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Bristol.		Liverpool.		London.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	<i>s. d.</i> per 12 lb.	<i>s. d.</i> per 12 lb.	<i>s. d.</i> per 12 lb.	<i>s. d.</i> per 12 lb.	<i>s. d.</i> per 12 lb.	<i>s. d.</i> per 12 lb.
BUTTER :—						
British ... ..	14 0	13 0	—	—	13 0	11 9
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery ... ..	107 6	105 6	103 0	101 0	106 6	105 0
„ Factory ... ..	94 6	87 0	89 0	80 0	90 6	85 6
Danish ... ..	—	—	110 6	107 6	111 0	109 6
French ... ..	—	—	—	—	114 6	112 0
Russian ... ..	100 6	96 6	97 6	94 0	98 0	95 0
Australian ... ..	102 6	97 6	100 6	96 6	103 0	100 0
New Zealand ... ..	109 0	105 0	107 0	105 0	107 6	105 0
Argentine ... ..	—	—	100 0	98 0	100 0	98 0
CHEESE :—						
British—						
Cheddar ... ..	76 0	71 0	75 0	71 6	80 0	76 6
			120 lb.	120 lb.	120 lb.	120 lb.
Cheshire ... ..	—	—	66 6	61 6	82 0	76 6
			per cwt.	per cwt.	per cwt.	per cwt.
Canadian ... ..	65 0	63 0	60 6	58 0	65 6	64 6
BACON :—						
Irish ... ..	68 6	63 0	66 6	60 6	71 0	66 0
Canadian ... ..	54 6	51 6	51 6	49 0	55 6	53 0
HAMS :—						
Cumberland ... ..	—	—	—	—	110 0	100 0
Irish ... ..	—	—	—	—	103 6	99 0
American (long cut)	62 0	57 0	61 6	56 0	66 0	61 6
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British ... ..	8 9	—	—	—	9 2	8 6
Irish ... ..	8 1	7 8	7 9	7 1	8 7	7 7
Danish ... ..	—	—	9 0	8 6	9 2	8 1
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Langworthy ... ..	105 0	87 6	105 0	95 0	118 6	105 0
Scottish Triumph ... ..	103 6	90 0	90 0	81 6	113 6	102 6
Up-to-Date ... ..	105 0	90 0	90 0	81 6	111 6	101 6
HAY :—						
Clover ... ..	90 0	75 0	93 6	70 0	100 0	83 6
Meadow ... ..	77 6	60 0	—	—	89 0	66 6

## DISEASES OF ANIMALS ACTS, 1894 to 1910.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

## GREAT BRITAIN.

*(From the Returns of the Board of Agriculture and Fisheries.)*

DISEASE.	MAY.		FIVE MONTHS ENDED MAY.	
	1911.	1910.	1911.	1910.
<b>Swine-Fever :—</b>				
Outbreaks ... ..	261	140	1,016	521
Swine Slaughtered as diseased or exposed to infection ...	2,828	1,644	10,797	4,676
<b>Anthrax :—</b>				
Outbreaks* ... ..	67	140	410	662
Animals attacked ... ..	103	168	501	813
<b>Foot-and-Mouth Disease :—</b>				
Outbreaks ... ..	—	—	1	—
Animals attacked ... ..	—	—	18	—
<b>Glanders (including Farcy) :—</b>				
Outbreaks ... ..	17	27	88	151
Animals attacked ... ..	26	95	240	407
<b>Sheep-Scab :—</b>				
Outbreaks ... ..	10	9	297	310

\* For 1910 the figures show the outbreaks reported, but for 1911 the outbreaks confirmed.

## IRELAND.

*(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)*

DISEASE.	MAY.		FIVE MONTHS ENDED MAY.	
	1911.	1910.	1911.	1910.
<b>Swine-Fever :—</b>				
Outbreaks ... ..	4	11	49	40
Swine Slaughtered as diseased or exposed to infection ...	17	221	816	906
<b>Anthrax :—</b>				
Outbreaks ... ..	2	—	5	4
Animals attacked ... ..	2	—	5	6
<b>Glanders (including Farcy) :—</b>				
Outbreaks ... ..	—	—	1	1
Animals attacked ... ..	—	—	2	2
<b>Sheep-Scab :—</b>				
Outbreaks ... ..	12	35	236	326

## ADDITIONS TO THE LIBRARY.

[NOTE.—The receipt of *annual* publications of foreign agricultural and other departments, experiment stations and societies is not noted in the monthly list of additions to the Library. A list of these publications appeared in the *Journal* for October, November, and December, 1909.]

## Agriculture, General and Miscellaneous—

*East Suffolk County Education Committee*.—Results of the Experiments carried out at Rendham, near Saxmundham, 1910. (11 pp.) Ipswich, 1911. [B. 46.]

*Utah Agricultural Experiment Station*.—Bull. No. 112 :—A Report of Seven Years' Investigation of Dry Farming Methods. (93–162 pp.) Logan, Utah, 1910. [B. 56–1.]

*Iowa Agricultural Experiment Station*.—Bull. No. 121 :—Creamery Book-keeping. (303–322 pp.) Ames, Iowa, 1911. [B. 50; G. 56–1.]

*Druce, C. G.*—Hayward's Botanist's Pocket-Book. [13th edition.] (280 pp. London : G. Bell and Sons, 1909. 4s. 6d. [B. 16–1.]

## Plant Diseases—

*University of California Agricultural Experiment Station*.—Bull. No. 207 :—The Control of the Argentine Ant. (51–82 pp.) 1910. [E. 40–51.] Bull. No. 208 :—The Late Blight of Celery (*Septoria petroselinii*). (83–115 pp.) 1911. [E. 60–7.] Berkeley, California.

*Lemcke, Dr. A.*—Die Verbreitung des amerikanischen Stachelbeermehltaus in der Provinz Ostpreussen im Jahre 1908. [Arbeiten der Landwirtschaftskammer für die Provinz Ostpreussen, No. 24.] Königsberg : Gräfe und Anzer Verlag, 1909. [E. 60–25.]

*U.S. Dept. of Agriculture, Bureau of Entomology*.—Circ. No. 132 :—The Periodical Cicada in 1911. (6 pp.) [E. 40–51.] Circ. No. 133 :—The Alfalfa Caterpillar. (14 pp.) [E. 40–51.] Circ. No. 134 :—Damage to Telephone and Telegraph Poles by Wood-Boring Insects. (6 pp.) [E. 40–13.] Circ. No. 135 :—The Asparagus Miner. (5 pp.) [E. 40–51.] Circ. No. 137 :—The Alfalfa Weevil. (9 pp.) [E. 40–51.] Bull. No. 82, Part VII. :—Some Insects Injurious to Truck Crops.—Notes on Various Truck-Crop Insects. (81–93 pp. [E. 40–11.] Bull. No. 95, Part II. :—Papers on Cereal and Forage Insects.—The Maize Billbug. (11–22 pp.) [E. 40–51.] Technical Series, No. 19, Part III. :—Technical Results from the Gipsy Moth Parasite Laboratory, III., Investigations into the Habits of Certain Sarcophagidae. (25–32 pp.) [E. 40–9.] Technical Series, No. 20, Part II. :—Papers on Miscellaneous Forest Insects, II., The Genotypes of the Sawflies and Woodwasps, or the Superfamily Tenthredinoidea. (69–109 pp.) [E. 40–3.] Washington, 1911.

*University College of N. Wales, Bangor*.—Bull. No. V. :—Potatoes—Effect of Spraying, 1910. (4 pp.) Bangor, 1911. [E. 60–37.]

*New York Agricultural Experiment Station*.—Bull. No. 328 :—Notes on New York Plant Diseases, I. (305–404 pp.) [E. 8.] Bull. No. 329 :—Chemical Investigation of Best Conditions for making the Lime-Sulphur Wash. (405–449 pp.) [E. 20–5.] Bull. No. 330 :—Experiments with Home-made Concentrated Lime-Sulphur Mixtures. (451–484 pp.) [E. 20–5.] Technical Bull. No. 17 :—The Apple and Pear Membracids. [E. 40–51.] Geneva, New York, 1910.

*Kentucky Agricultural Experiment Station*.—Bull. No. 147 :—Common Insecticides and Fungicides, with Directions for the Treatment of Farm Pests. (40 pp.) Lexington, Kentucky, 1910. [E. 20–3.]

*Purdue University Agricultural Experiment Station*.—Circ. No. 22 :—The Loose Smut of Oats and Stinking Smut of Wheat and their Prevention. (15 pp.) Lafayette, Indiana, 1910. [E. 60–21.]



- West of Scotland Agricultural College*.—Bull. No. 56 :—Reports on Experiments (b) On the Prevention of Finger-and-Toe in Turnips. (231-248 pp.) Glasgow, 1911. [E. 60-33.]
- National Fruit and Cider Institute*.—Leaflet No. 5 :—Potato Spraying Experiments, 1910. (5 pp.) [E. 60-37.] Leaflet No. 6 :—The Use of Copper Sulphate as a Fungicide. (4 pp.) [E. 20-5.]
- Stevens, F. L., and Hall, J. G.*—Diseases of Economic Plants. (513 pp.) New York : The Macmillan Co., 1910. 8s. 6d. net. [E. 60-1.]
- North Carolina Agricultural Experiment Station*.—Bull. No. 212 :—Prevention of Oat and Wheat Smut. (71-84 pp.) West Raleigh, North Carolina, 1910. [E. 60-21.]
- Michigan Agricultural Experiment Station*.—Technical Bull. No. 6 :—Lime-Sulfur Spray. (15 pp.) [E. 20-5.] Circ. No. 10 :—Manufacture and Storage of Lime-Sulfur Spray. (67-77 pp.) [E. 20-5.] East Lansing, Michigan, 1911.
- Nevada Agricultural Experiment Station*.—Bull. No. 76 :—The Potato Eelworm. (7 pp.) Reno, Nevada, 1911. [E. 40-49.]
- Massee, G., and Theobald, F. V.*—The Enemies of the Rose. [1910 edition.] (97 pp.) National Rose Society, 1910. [E. 20-1.]
- U.S. Dept. of Agriculture*.—Farmers' Bull. No. 440 :—Spraying Peaches for the Control of Brown-Rot, Scab, and Curculio. (40 pp.) Washington, 1911. [E. 60-11; E. 40-15.]
- Collinge, W. E.*—The Treatment of Finger and Toe Disease. [Reprinted from the Journal of the Land Agents' Society.] (4 pp.) 1911. [E. 60-33.]
- Collections Zoologiques du Baron Edm. de Selys Longchamps*.—Catalogue Systématique et Descriptif.\* Fasc. V. (1er partie) :—Megaloptera. (93 pp. +4 plates.) Fasc. XII. :—Libellulinen. (385-528 pp. and plate.) Brussels, 1911. [K. 2.]

### Live Stock—

- Douglas, L. M.*—Swine Husbandry. (16 pp.) [Journal of Farmers' Club, January, 1911.] [F. 82.]
- Nickisson, J. L.*—The Government Horse-Breeding Scheme from a Farmer's Point of View. (36 pp.) [Journal of the Farmers' Club, February, 1911.] [F. 64-1.]
- U.S. Dept. of Agriculture, Bureau of Animal Industry*.—Circ. No. 168 :—A Note on the Feeding Value of Coconut and Peanut Meals for Horses. (2 pp.) [F. 64-3.] Circ. No. 173 :—The Sanitary Construction and Equipment of Abattoirs and Packing Houses. (247-263 pp.) [F. 72.] Bull. No. 132 :—A Bacteriological Study of Ham Souring. (55 pp.) [F. 82-3.] Washington, 1911.
- New Hampshire Agricultural Experiment Station*.—Bull. No. 152 :—Feeding Sheep and Lambs : Clover Hay v. Native Hay; Turnips v. Dry Ration. (19 pp.) Durham, New Hampshire, 1911. [F. 76-1.]
- Montana Agricultural Experiment Station*.—Bull. No. 78 :—Steer Feeding. Small Grains and Clover Hay for Two Year Old Steers. (37-48 pp.) Bozeman, Montana, 1910. [F. 68-1.]
- North Carolina Agricultural Experiment Station*.—Bull. No. 213 :—Feeding Experiments with Cows and Calves. (85-97 pp.) West Raleigh, North Carolina, 1910. [F. 68-1.]
- Louisiana Agricultural Experiment Station*.—Bull. No. 124 :—Part I.—Breeds of Hogs. [F. 82.] Part II.—The Best Crops to Grow for Hogs and other Data. [F. 82-1.] (56 pp.) Baton Rouge, Louisiana, 1910.
- Missouri Agricultural Experiment Station*.—Circ. No. 47 :—Raising Calves on Skim-milk. (99-106 pp.) [F. 68-3.] Bull. No. 90 :—Fattening Cattle on Blue Grass Pasture : An Investigation of the Factors of Age, Condition, Kind of Ration and Length of Feeding Period in Beef Production. (283-388 pp.) [F. 68-1.] Bull. No. 95 :—Pork Production with Forage

Crops; Clover, Alfalfa, Rape, Corn, Rye Grain, Cowpeas, Soybeans, Sorghum. (561-597 pp.) [F. 82-1.] Columbia, Missouri, 1911.

Douglas, Loudon M.—The Progress of Bacon-Curing. [Reprinted from the Transactions of the Highland and Agricul. Socy. of Scotland, 1911.] (12 pp.) 1911. [F. 82-3.]

#### Dairying and Food, General—

U.S. Dept. of Agriculture, Office of Experiment Stations.—Circ. 110:—Food Customs and Diet in American Homes. (32 pp.) Washington, 1911. [G. 73-3.]

U.S. Dept. of Agriculture, Bureau of Animal Industry.—Circ. No. 166:—The Digestibility of Cheese. (22 pp.) [G. 66; G. 73-3.] Circ. No. 170:—The Extra Cost of Producing Clean Milk. (119-131 pp.) [G. 56-1.] Washington, 1911.

South Dakota Agricultural Experiment Station.—Bull. No. 123:—Milk Powder Starters in Creameries. (14 pp.) Brookings, South Dakota, 1910. [G. 54-3.]

Wisconsin Agricultural Experiment Station.—Circular of Information No. 10:—Operating the Casein Test at Cheese Factories. (4 pp.) [G. 66.] No. 14:—The Determination of Salt in Butter at the Creamery. (7 pp.) [G. 60-3.] Madison, Wisconsin, 1910.

U.S. Public Health and Marine-Hospital Service, Hygienic Laboratory.—Bull. No. 41:—Milk and its Relation to the Public Health. (757 pp.) Washington, 1908. [G. 56-1; G. 56-9.]

#### Veterinary Science—

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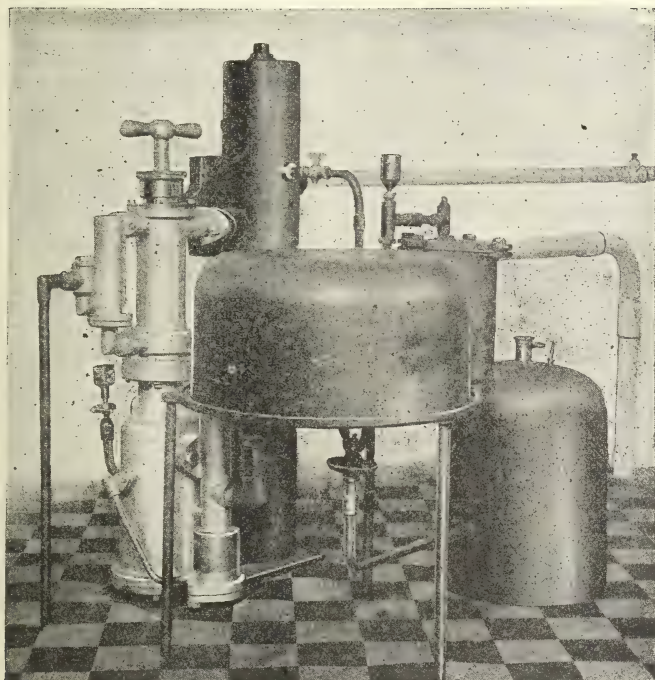
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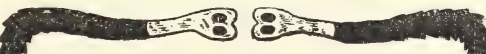
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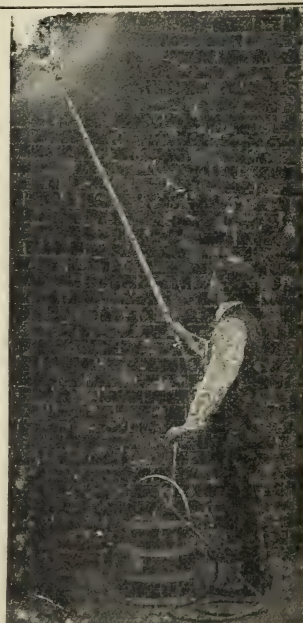
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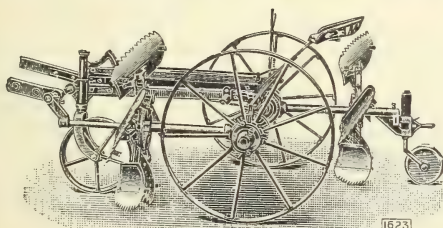


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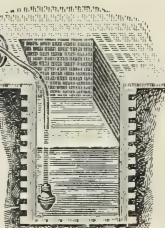
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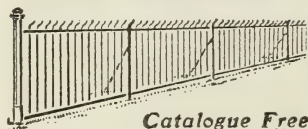
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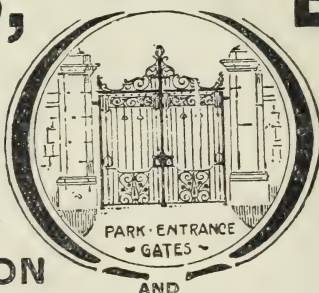
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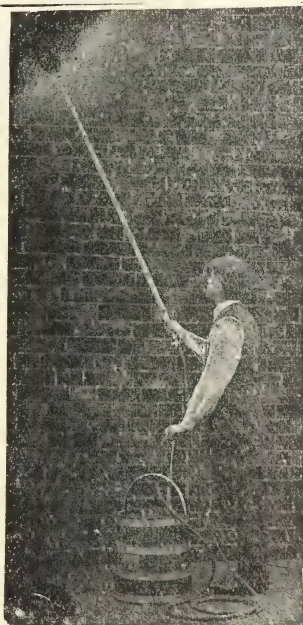
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# THE JOURNAL OF THE BOARD OF AGRICULTURE

Vol. XVIII. No. 4.

JULY, 1911.

## INCREASING THE DURABILITY OF TIMBER.

WILLIAM SOMERVILLE, M.A., D.Sc.

*Sibthorpe Professor of Rural Economy, Oxford.*

It has long been recognised that much may be done to increase the durability of timber. It is for this purpose that outside woodwork is often painted, though incidentally the appearance of the object so treated may also be improved. The intention of applying a coat of paint or similar material is to exclude moisture, because it is known that decay of wood—as of all other vegetable substances—is in some way connected with the presence of water. In a sense this is only half a truth, because wood may be saturated with water and yet may show great resistance to decay. This is illustrated by the fact that the woodwork of Roman bridges has been removed from the beds of rivers, in a comparatively sound condition after immersion for nearly 2,000 years. Similarly in the case of peat bogs, from which the trunks of trees in a perfectly sound condition are removed after having lain for many thousands of years. We have another example of the preservation of wood through the agency of water in the so-called “ponds” that one sees alongside many tidal rivers, where imported timber is often kept for years in a much better state than would be the case were it piled on shore.

The fact is that whereas moisture is a necessary condition of decay, it cannot act in this way unless assisted by air, and air is practically absent in wood that is saturated with water, as in the piles of bridges, in bog-oak, and in timber immersed in tidal “ponds.” Water and air are both essential

conditions of decay, and both must be present to facilitate decomposition, that is to say, wood may be completely permeated with air, and yet will remain sound if no water is present, or it may be completely saturated with water in the absence of air, and yet show but little sign of undergoing decomposition. But if both water and air are present in wood to a sufficient extent, then the conditions of decomposition are at their best, and decay will proceed more or less rapidly, the rate depending on the temperature.

The reason for this is that the destruction of wood by the process of rotting depends on the work of living organisms, especially fungi, and just as moisture, air, and a suitable temperature are necessary factors in the growth of higher plants, so are they necessary conditions in the destructive growth of the lowly plants that induce decay in structural timber. When, therefore, a coat of paint is laid upon wood it assists in its preservation, because it excludes moisture, and, to some extent, air, but it will only be effective if the wood has been thoroughly dried before the paint is laid on. Should the wood be wet to begin with, or imperfectly seasoned, painting it may do more harm than good, because the moisture will be imprisoned and prevented escaping, and conditions favourable to decay are created and maintained.

Besides oil paint, several other substances are used to waterproof wood, such as coal tar, and although the latter is objectionable from some points of view, it makes an excellent coat, which, being more or less elastic, admits of the contraction and expansion which the wood undergoes under the influence of changes of temperature. A coating that cracks readily is quite unsuitable, because through the openings thus formed water and the spores of fungi gain an entrance, and decay is rapidly set up.

At one time—and to some extent still—posts used for gates, fences, and sheds were charred for one to two feet at the part that would come immediately above and below the surface of the ground. This part of a post has always been recognised as the point of weakness, because there—"between wind and water," as it is called—decay always begins first and progresses most rapidly. The reason for this is that near the ground level the wood draws water from the soil, while

air freely enters from above, and the conditions of decay are at their best. The lower extremity of the post is in contact with more moisture, but air is excluded by the mass of soil; while the upper part of the post is comparatively dry, although it is in free contact with air. After being for some years in position, if such a post be removed from the ground and examined, it will be found to be practically sound in every part, except at the place corresponding with the position of the surface of the ground. This, then, is the weakest part in the wood, and one way in which an attempt is made to strengthen it is by charring it. The effects of charring are due to the destruction of wood to the depth of half an inch or so, the resins, gums, tannin, &c., which this wood contains being driven in front of the heat, until they saturate a layer which then acts as a protecting mantle to the deeper wood. To be effective charring must proceed so far as to convert a considerable amount of wood into charcoal—a mere singeing or scorching of the wood will do more harm than good, as it will cause the wood to crack and thus form openings for the entrance of fungi, but will not have proceeded so far as to saturate a layer of wood with resin, &c. The destruction of the surface wood is necessarily accompanied by a weakening of the post, and it is doubtful whether, on the whole, the charring of posts is a profitable process.

Of the various methods that are practised for increasing the durability of timber, that which at present occupies the foremost place is the application of creosote. This substance owes its efficacy to the fact that it is a virulent plant poison, so that wood which contains a considerable quantity of creosote is more or less completely protected against the attack of decay-inducing organisms such as fungi. Wood, when in its natural state, holds certain substances (starch, proteins, &c.), which are the special food of fungi, but when these are saturated by creosote they are incapable of sustaining fungoid life. Creosote also acts as a preservative to some extent owing to the fact that it displaces air and water in the tissues of the wood, and these are essential to the process of decay. Many other substances besides creosote have been used as preservatives, such as copper sulphate, zinc chloride, and corrosive sublimate, but on account of their cost, or



because they are poisonous to animals, or on account of their being easily washed out by rain, or because they corrode metal, they have all been supplanted more or less completely by creosote, except in countries where this substance is much dearer than in Britain.

On a large scale creosote is usually applied under pressure, and this process entails the provision of a somewhat costly plant. But on account of the thoroughness and rapidity with which the impregnation is carried out, the outlay on a pressure plant is justified where a large amount of timber has to be dealt with, and such plants are now to be found on many estates. In outline the process may thus be described:—The timber to be treated is well-seasoned so as to get rid of surplus moisture, and the posts (barked), rails, gates, troughs, or whatever the articles may be, are finished in every respect before being placed in the creosoting chamber. It is very important that there should be no cutting of the wood after the treatment, as this would mean interruption of the layer where most of the creosote is deposited, and water would enter, more or less freely, through this point of weakness. The articles are then loaded on to small waggons or bogies that run on rails, and are pushed into the creosoting chamber, which is essentially of the character of a large horizontal steam boiler. The door is then closed and firmly bolted, and an air-pump is set to work to reduce the pressure in the chamber. The air is thus partially removed from the wood, and when the vacuum gauge indicates a pressure of about half an atmosphere, the creosote, which should be previously heated, is allowed to fill the chamber. The air pump is now stopped, and a pressure of 80 to 85 lb. per sq. in. is applied, the creosote being thus forced into the wood. In two or three hours, or less, the wood will have taken up as much creosote as is deemed desirable; when the surplus liquid is pumped from the chamber into a suitable receptacle, the door is opened, and the bogey, with its load, run out.

The amount of creosote or other fluid that wood will absorb varies greatly with species and other causes. Heartwood takes up much less than sapwood, damp wood takes up less than dry, slow-grown pine takes up less than fast-grown,

and conifers as a rule take up less than broad-leaved trees. The wood that is subjected, more than any other, to the process of creosoting, is Baltic Yellow Deal, otherwise known as Baltic Red Wood, which is precisely the same species as Scots Pine. This is the wood chiefly used for railway sleepers and telegraph posts, so that enormous quantities have to be treated annually. As a rule the railway companies specify that each cubic foot shall contain one gallon of creosote, and for estate purposes this is as far as one can afford to go, seeing that creosote now generally costs 4*d.* or more per gallon, and therefore by the absorption of a gallon the cost of the wood is raised by this amount, apart from considerations of labour and interest on plant. Certain soft woods, however, can absorb up to four gallons of creosote per cubic foot, and many will take up two gallons. Apart from the cost, there is little to be gained by exceeding one gallon, for in the course of time the excess, beyond what the wood can really hold, will simply flow out into the soil and be lost.

The great value of creosoting for estate purposes consists in this, that it so prolongs the "life" of low-class timber as to enable such material to be used for fencing and other purposes. Spruce and Scots Pine thinnings, for instance, which will only last for three or four years if used as posts (called in Scotland stobs, and in some parts of England stumps), in their natural state will, if creosoted, remain serviceable for from twelve to fifteen years. Larch thinnings, although more durable than spruce or pine, should also be creosoted before being used as posts. There are several broad-leaved species that furnish large quantities of small wood on many estates, which, in their natural state, are not worth the labour of using for fencing purposes, and yet which are thoroughly serviceable when creosoted. To this group belong Alder, Beech, Hornbeam, Sycamore, Ash, Birch, and Poplar. Even coppice oak has little durability when in its natural state, and ought always to be creosoted before use.

On small estates the cost of erecting and working a pressure creosoting plant is prohibitive, but excellent results can be obtained by simpler methods. Many make use of an iron tank erected on brickwork in such a way that the creosote can be raised to near the boiling-point by means of a fire

underneath the tank. Immersion in such hot creosote for eight or nine hours will confer on wood most of the benefits got from two or three hours' treatment in a pressure chamber. The tank should be protected against rain by means of a light roof, and care must be taken against fire, creosote being highly inflammable.

Even a tank where the creosote can be heated is, however, a more elaborate arrangement than is necessary upon a farm or quite small estate. While heating assists in driving the creosote into the wood, cold creosote will enter almost as far, if more time be allowed. Even where only a few hundred posts (stobs) are being used, it pays well, unless the wood is mature larch or oak, to provide a tank in which the lower part of each post can be treated. Remembering that the upper part of the post will, in its untreated condition, usually last for many years, it is the lower part that chiefly requires treatment; that is to say, the posts may be set vertically in the tank, with their upper half or so above the liquid. If it is desired to treat gates, hurdles, and rails, the tank must be proportionately longer and deeper, but a very simple arrangement suffices to treat the lower half of a fencing post. An ordinary intermediate fencing post is generally placed in the ground to a depth, at most, of about 2 feet, so that the part "between wind and water" will be treated if it is immersed in creosote to a depth of  $2\frac{1}{2}$  feet. A suitable receptacle for the creosote is a galvanised iron tank 8 feet long,  $2\frac{1}{2}$  feet wide, and 3 feet deep. This will hold 150 to 200 ordinary posts placed vertically, and will when required also admit of about a dozen straining posts being laid horizontally in it. When the posts are set in the trough the liquid is fairly rapidly absorbed, and as the level falls more creosote must be added. The posts should stand in the liquid for three or four weeks, and if a fresh lot is inserted without loss of time it is evident that two to three thousand can be passed through in a year. Four ordinary posts will absorb about a gallon of creosote, so that the cost of material for each post is only about one penny, and the labour and interest on the cost of the trough is practically negligible. It is desirable that the process should be conducted away from buildings, but a



light roof should be provided to keep off the rain. Needless to say, the drier the wood to start with the better will be the results. As a 40-gallon barrel of creosote is rather inconvenient to handle, it is an advantage to construct a small platform at one end of the tank, on to which the barrels may be unloaded from the cart. One or two sheets of corrugated iron should be placed in such a position that when the posts are removed from the tank and set up to drip, the creosote that runs off shall flow back into the tank.

It is surprising how high creosote will rise in certain kinds of wood, and it is not unusual to see the material showing on the upper surface of a five-foot post when not more than two feet are immersed in the creosote.

Hop poles are almost invariably creosoted in their lower ends ("dipped," as it is called) before use, heat being generally employed in the process. Stakes for supporting fruit and other trees should also be similarly treated, and if this is done they may often be used several times over. Sheep troughs last much longer if creosoted, while the same remark applies to poultry coops, with the additional advantage that they are made distasteful to vermin.

In the *Quarterly Journal of Forestry* for 1909, Mr. E. R. Pratt, of Ryston Hall, Norfolk, describes his method of using cold creosote, and gives specifications for the construction of a concrete tank, 24 ft. long, 5 ft. deep, and  $2\frac{3}{4}$  ft. wide, the total cost, including a drying stage, being £9 5s. In his opinion immersion for a week in cold creosote produces about one-half the effect that is obtained by treatment with hot creosote either with or without pressure. But, if time permit, a longer immersion than one week is desirable, when the results of the most simple process will be almost as good as those obtained by more elaborate and more costly methods.

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## THE IDENTIFICATION AND ERADICATION OF SOME COMMON WEEDS.

### I.

HAROLD C. LONG, B.Sc. (EDIN.),

*With Drawings from Nature by BERTHA REID.*

THE part played by weeds in farm economy is now recognised by all practical farmers, and the Board have already directed attention to the subject in a widely distributed leaflet,\* in which the damage done by weeds, the manner of their distribution, and the general methods which may be brought into requisition in suppressing them, have been briefly described. Other leaflets deal specifically with certain of the more troublesome weeds.

In general, botanical works only aid the reader to identify plants in the flowering or mature stage, and at such a stage weeds have usually accomplished the damage it is the farmer's object to prevent. It may be very properly said that weeds should be destroyed in their seedling stage, and for this reason some may argue that there is no necessity for their identification at all. Weeds of different species, however, not only vary considerably in the amount of damage they are able to accomplish, but also in their general vitality and the measures necessary for their eradication. Some wild plants are of so little consequence to economic agriculture that they may be neglected; other species are harmful if plentiful; while yet others may, if they once obtain a sure footing, prove an actual scourge, and involve very great labour, expense, and loss.

It cannot but be of great value to farmers and gardeners to be in a position to identify weeds—and even the cultivated crops among which the weeds grow—at all stages of their life, from the seed to the time the flowers are produced, and to have a knowledge of their life history and habits. Such a knowledge of a given weed will at the outset enable one to decide whether it is a serious pest or is unlikely to cause trouble, while it will largely suggest what type of protective and remedial measures may most successfully be adopted.

### CORN BUTTERCUP.

The Corn Buttercup (*Ranunculus arvensis*, L.), known also as Corn Crowfoot, or Watch Wheels, is an annual weed of

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\* No. 112 (*Weeds and their Suppression*).



FIG. 1.—CORN BUTTERCUP (*Ranunculus arvensis*, L.).

*a*, Fruit, enlarged; *b*, cotyledon stage of seedling  $\times 1$ ; *c*, second stage of seedling  $\times 1$ ; *d*, third stage of seedling  $\times 1$ ; *e*, flowering portion  $\times 1$ .





cornfields on most soils, though it would appear to flourish best on the chalk, on heavy land. A North Lincolnshire correspondent informs the writer that the weed is there plentiful on the strong clay of the wolds, but is less common on the light soils, while it occurs in summer fallow wheat and winter sown barley more than in spring corn. In Hertfordshire and Bedfordshire also the Corn Buttercup is characteristic of clay soils.

*Fruits.*—The fruits (Fig. 1, *a*) achenes or nutlets of the Corn Buttercup are brown in colour, rather large ( $\cdot 2$  to  $\cdot 24$  in. long by  $\cdot 16$  in. broad by  $\cdot 04$  in. thick—5 to 6 mm. long by 4 mm. broad, by 1 mm. thick), woody, flat and unsymmetrical, with hooked spines on either side, the larger spines to the outside, and from their appearance the weed is sometimes termed “watch wheels.” The spinous processes may serve both to distribute the pest and to protect the seed and ensure germination. The fruits occur commonly in samples of cereal grains, and also in unmilled sainfoin, which they resemble in size and colour. One hundred large air-dried two-year-old achenes weigh 1·219 grams, equal to about 37,300 to the pound.\*

*Seedlings.*—The early stage seedling (Fig. 1, *b*) shows the root and base of the hypocotyl (the portion between the root and the cotyledons) to be markedly divided into three or four branches or rootlets. The hypocotyl is white, stout and smooth, and slightly swollen at the junction with the cotyledons, or seed-leaves. The cotyledons themselves are pale dull green both above and below, smooth, oval or round-oval, contracting below into a broad and almost flat petiole (leaf-stalk) which is slightly hollowed above. Three distinct veins are visible below, running from the base towards the apex; one being in the centre and the other two curving outward on either side. At first the cotyledons are almost vertical, but expand until horizontal; they are  $\frac{1}{4}$ — $\frac{3}{10}$  in. long, and  $\frac{1}{6}$ — $\frac{1}{5}$  in. broad (6 to 7·5 mm. long, and 4 to 5 mm. broad).

A little later stage (Fig. 1, *c*) shows the seedling to have a tufted and fibrous root, while the hypocotyl is white or slightly tinged reddish-brown above. The first leaves are radical, and almost triangular or wedge-shaped, the broad

\* *Landw. Samenkunde*, C. D. Harz, 1885.

apex being divided into three or four teeth; the leaf stalks are concave above; and the leaf has clearly marked veins or ribs running from the base to the teeth at the top of the leaf.

As the seedling grows (Fig. 1, *d*) the cotyledons expand considerably until about  $\frac{1}{2}$  in. long by  $\frac{3}{10}$  in. broad (12.5 mm. long by 7.5 mm. broad). The true leaves are now larger, shield-shaped to triangular, with an increased number of teeth, while the later leaves are more and more deeply cut until trifid, each portion being toothed or lobed. All leaves are smooth.

*Mature Plant.*—The mature plant resembles the buttercups generally, the leaves being variably segmented and toothed, and the flowering stems 1–2 ft. high. The flowers are pale yellow, about  $\frac{1}{3}$  in. in diameter, and open from May to July.

*Prevention and Remedy.*—Care should be taken to sow cereal grain and unmilled sainfoin, which are free from the seeds of Corn Buttercup. The weed when present may be combated (1) by surface cultivation in spring to encourage germination of the seeds, when the seedlings may be destroyed by means of harrows and the hoe; and (2) by hoeing out or hand-pulling older plants before seeding occurs.

#### COMMON FUMITORY.

The weed known as Fumitory (*Fumaria officinalis*, L.) is an annual of 1–1½ ft. in height, but rather prostrate in habit. It is at times very plentiful on light sandy, calcareous and loamy soils, and may prove exceedingly troublesome. Brencley found that in Hertfordshire and Bedfordshire it is characteristic of chalk land, and is occasionally “so prevalent on chalk that it is necessary to hand cultivate to get rid of it in order to save the crop. This is notably the case in the Maiden’s Bower, an old Roman encampment near Dunstable.” \*

Holdich observes of fumitory: “This is a very common weed on certain light, sandy soils; it indicates the want of manure, and the neglect of the drill or row mode of culture.” †

*Seeds.*—The seeds of fumitory are enclosed singly in a

\* *Journal of the Board of Agriculture*, April, 1911, p. 24.

† *An Essay on the Weeds of Agriculture*, Benjamin Holdich. Edited by G. Sinclair, 3rd ed., 1825.





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FIG. 2.—COMMON FUMITORY (*Fumaria officinalis*, L.).

*a*, Fruit, enlarged; *b*, cotyledon stage of seedling  $\times 1$ ; *b'*, single cotyledon, enlarged; *c*, second stage of seedling  $\times 1$ ; *d*, third stage of seedling  $\times 1$ ; *e*, flowering portion  $\times 1$ .



somewhat spherical to pear-shaped nutlet or fruit (Fig. 2, *a*) which is about .08 in. (2 mm.) in diameter, greenish to brown, with a slightly rough surface (due to the presence of minute tubercles), and two shallow dimples at the upper somewhat depressed end. The fruits are found in cereal grain samples, in clover seed samples, and sometimes in South American red clover and lucerne samples.

Ewart says that "The seeds appear able to lie dormant in the soil for a few years, coming up when the ground is broken up and seeded down, and often giving rise to complaints that a seedsman has sold seed of this plant instead of grass or clover seed." \*

*Seedlings.*—In the seed-leaf stage (Fig. 2, *b*) the root is thin and fibrous; the hypocotyl is slender, white below and brightly tinged with red above, and smooth. The cotyledons are grass green, linear and narrow ( $\frac{1}{2}$  in. long by  $\frac{1}{20}$  in. broad—12.5 mm. long by 1.27 mm. broad), smooth, pointed, broadest towards the centre, and narrowing below, and with a midrib clearly visible beneath.

With further growth (Fig. 2, *c*) the hypocotyl becomes brownish-red and the cotyledons enlarge to  $\frac{5}{8}$  in. (21 mm.) long; the first leaves are deeply lobed or divided and cut, smooth, and petiolate (stalked), the stalk being hollowed above and convex below.

The hypocotyl gradually changes to brown and the cotyledons fade somewhat, and the leaves are now (Fig. 2, *d*) trifid or three-lobed, and repeatedly cut and lobed.

*Mature Plant.*—In the flowering plant (Fig. 2, *e*) the foliage is repeatedly cut and lobed, delicately pale green, and quite smooth; the weed is sometimes nearly 3 ft. high, when it is weak and trailing in character. The flowers are irregular, and pale rose-purple in colour, occurring in long clusters or racemes placed at the end of the stem or opposite the leaves; they open from May to September.

*Prevention and Remedy.*—Fumitory may be combated by repeated surface cultivation during spring and early summer, and thereafter by persistent hoeing of root crops. In corn crops hand pulling may be necessary after the cereal is so high that cultivation is not practicable.

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\* *Weeds, Poison Plants, and Naturalised Aliens of Victoria*, Dr. A. J. Ewart, 1909.



## SPURREY.

Spurrey, Corn Spurrey, Sandweed, Yarr or Pickpurse (*Spergula arvensis*, L.) must be reckoned as one of the farmer's most troublesome pests on light sandy soils, where it too often occurs in overwhelming quantity. Spurrey is usually considered as typical of light sandy soils and as an indication of the absence of lime, is an annual, and produces seed in abundance. The seed germinates readily and may give rise to seedlings an inch high in a week, and thereafter growth is rapid, and unless something be done seed is quickly ripened and scattered. The weed may invade corn crops, roots, and clover fields, and if plentiful may practically suppress spring and summer sown crops.

Over a hundred years ago William Pitt wrote of this weed: "As it is of humble growth, I have never observed it to be very injurious to a crop; but Dr. Anderson observes, that in Aberdeenshire it is a pernicious weed, growing in such abundance among the crops as to choke the grain; he has seen it so thick that over a vast extent of surface you could not have put down a pin without touching a plant, and the farmers there think it indestructible." \*

*Seed.*—The seeds of spurrey (Fig. 3, *a*) are dull black, round; and somewhat flattened, or lens-shaped, and are surrounded with a narrow, flat wing of a pale brown colour, while the surface is rough with minute greyish-brown or yellowish papillæ. They are .03 to .05 in. (0.8 to 1.36 mm.) in diameter, and .035 in. (0.88 mm.) in thickness, and Harz states that 200 large seeds weigh 0.1637 grams, equal to 597,000 per pound. They occur occasionally in European clover and grass seeds.

*Seedlings.*—In the seed-leaf stage (Fig. 3, *b*) the root is small and fibrous in character. The hypocotyl is whitish to very light green, cylindrical and smooth. The cotyledons are smooth and shiny, linear, cylindrical, fleshy, and light green in colour; they are at first small, but grow considerably—from  $\frac{1}{8}$  in. to  $1\frac{1}{4}$  in. (8.5 to 31.5 mm.) in length.

In the next stage (Fig. 3, *c*) the cotyledons are 1 in. or over

\* William Pitt: "On the Subject of Weeding; or the Improvements to be effected in Agriculture by the Extirpation of Weeds."—*Communications to the Board of Agriculture*, Vol. V, 1806.



FIG. 3.—SPURREY (*Spergula arvensis*, L.).

*a*, Seeds, nat. size and magnified; *b*, cotyledon stage of seedling  $\times 1$ ; *c*, second stage of seedling  $\times 1$ ; *d*, third stage of seedling  $\times 1$ ; *e*, flowering portion  $\times \frac{2}{3}$ .





in length, and the first leaves closely resemble them, being light green, linear, cylindrical, fleshy, and opposite, giving a "tufty" appearance to the seedling.

As the seedling grows (Fig. 3, *d*) and the stem extends the leaves begin to appear in whorls of 6 to 8.

*Mature Plant.*—The grown plant (Fig. 3, *e*) is 6–18 in. high, much branched, with thickened joints or nodes. The leaves are opposite, two at each node, but owing to the presence of a pair of leaves at the base of the axillary branches, these leaves being between the primary ones, a pseudo-whorl is formed. The leaves are  $\frac{1}{2}$  to  $1\frac{1}{2}$  in. long, and awl-shaped. The whole plant has a somewhat sticky or viscid feel, and may be downy. The white flowers are borne on slender stalks in loose terminal clusters, are about  $\frac{1}{4}$  in. in diameter, and open from June to August. The white petals are usually shorter than the green, pointed sepals, this rendering the flowers inconspicuous. The seed capsules are nearly round and hang downwards.

*Prevention and Remedy.*—Among measures which may be adopted to combat spurrey are: (1) frequent surface cultivation in spring and summer; (2) thorough and frequent hoeing both by hand and by horse labour; (3) hand pulling in some cases; (4) the sowing of late quick-growing root crops which allows more time for spring cultivation; (5) sowing "seeds" in June without a corn crop, this plan also allowing spring cultivation; (6) *thorough liming*; (7) spraying where possible with a 5 per cent. solution of copper sulphate; (8) feeding off a badly infested crop with sheep before seeding takes place.

In certain Continental countries, especially Belgium, a variety of spurrey is grown as a fodder crop, and is even sometimes converted into hay. In his *Farm Foods* Wolff quotes the following analyses of spurrey:—

	Green.		Hay.	
	Total.	Digestible.	Total.	Digestible.
Water ... ..	80.0	—	16.7	—
Crude Albumen ... ..	2.3	—	12.0	—
„ Fibre ... ..	5.3	3.3	22.0	13.1
Nitrogen-free Extract ...	9.7	6.5	36.6	23.7
Fat ... ..	0.7	0.3	3.2	1.9
Ash ... ..	2.0	—	9.5	—
Albuminoids and Amides	—	1.5	—	7.6

Very light sandy soils might be considerably improved by ploughing in several crops of spurrey in succession, for it will grow in profusion on sands where many plants would not succeed at all, and its growth is so rapid that two or three crops may be raised in one season. Ploughing in would of course be effected as soon as the weed showed the first flowers. Depasturing the crops with sheep would also be very beneficial on such soils.

## THE COMPOSITION AND PROPERTIES OF CONCENTRATED FEEDING STUFFS.\* (*Contd.*)

### *The Chief Feeding Stuffs.*

LINSEED.—The chief sources of the supply of linseed are India, Russia, and America. Russian seed is smaller and also darker in colour than the Indian seed. Genuine well-cleaned linseed weighs not less than 52 lb. per bushel.

The use of linseed—as distinguished from linseed cake—among farmers is chiefly restricted to the feeding of calves. It is found that linseed meal or crushed linseed added to skim or separated milk is one of the safest and most economical substitutes for the abstracted milk-fat. Linseed approaches more nearly in composition to the solids of milk than any other food, and the oil which it contains, to the extent of 34 to 38 per cent., is easily digestible. There is, however, a risk in buying any grain or seed in the form of a meal, as it is difficult to detect impurities when the material is sold in this condition. Farmers purchasing any considerable quantity of linseed meal will be well advised to have samples analysed. One of the commonest adulterants of linseed meal is ground linseed cake. The latter does not contain more than one-sixth to one-third of the oil in pure linseed, and the relatively larger amount of fibre in it renders it unsuitable for giving to young calves as a substitute for milk fat. Again, the meal of almost any cereal grain can be mixed with linseed meal in fairly large proportions before the substitution is likely to be detected with the naked eye. The

\* This and the preceding article are now issued as a revised edition of Leaflet No. 74. Though some portions of the earlier edition of the Leaflet have been retained, the bulk of this article has been written by Dr. Charles Crowther, of The University, Leeds.

object of such admixture is at once apparent, for linseed cake and cereal meals cost, roughly, from £6 to £10 per ton, whereas the price of genuine linseed is frequently about £20 per ton. The risk would be obviated by purchasing whole linseed and having it ground at home, but the objection to this is the difficulty of grinding owing to the linseed clogging the grist-mill.

CAKES are the pressed residues obtained in the extraction of oils from various seeds and nuts, *e.g.*, linseed, cottonseed, rapeseed, cocoanuts, earth nuts, &c. Apart from mixtures of materials that are specially compressed into cakes and sold under the description of mixed or compound cakes or feeding cakes, only four distinct kinds of oil-cakes are commonly used in this country, viz., linseed cake, decorticated cotton cake, undecorticated cotton cake, and soy bean cake. To a limited extent, cocoanut cake and rape cake are also used.

Regarded as a group of feeding-stuffs, cakes may be considered as highly concentrated albuminoid or flesh-forming foods. For this reason, when consumed with a diet of straw and roots, which are essentially carbohydrate or heat-producing foods, they supply the feeding material that is most deficient. Where the straw is replaced by hay the concentrated food need not be so highly albuminoid in character, and, in that case, cereal grains may sometimes be economically substituted, partially or entirely, for cake.

Next to albuminoids the most important ingredient in cake is oil, and the price of certain sorts of cake is often largely controlled by the percentage of oil present. That the fattening capabilities of a cake are to some extent due to the oil there can be no doubt, as experiments upon sheep in this country have clearly shown the superiority of cakes rich in oil over others poor in this ingredient; but farmers should be careful that the extra percentage of oil in a cake is not purchased at too high a rate. It is well known that oil is not equally valuable from whatever source it is derived, and it is important that all the oil in a cake should be the natural product of the seed from which the cake takes its name. Thus in a linseed cake the whole of the oil present should be linseed oil.

Any substitution of mineral oils for vegetable oils must be



regarded as a flagrant adulteration, since the former have no appreciable feeding value.

Linseed and cotton cakes contain no starch or sugar, the carbohydrates being represented by mucilage and cellulose. The amount of these present in such cakes is of minor importance compared with the albuminoids and oil, because the heat-forming (carbohydrate) substance is supplied in large measure by the straw and other bulky material with which cakes are always fed. Mixed or compound cakes often contain starch and also some sugar, their ingredients comprising grain, maize, &c., and a certain amount of spice.

Cakes, if pure and well made and free from fibrous husk, are extremely digestible, often as much as 80 to 90 per cent. of the nutrient material in them being digested by cattle and sheep. The manurial residues of cakes made from oil seeds are of higher value than those of any other foods, although the residues of malt dust, dried grains, beans, and peas are not greatly inferior.

*Linseed Cake.*—This is the residue left after extracting the oil from linseed or flax-seed. The quality and character of the cake varies with the following conditions:—(1) The kind of linseed used; (2) the manner in which the seed has been screened and freed from its impurities; (3) the amount of pressure and the degree of heating that have been employed in the extraction of the oil and the compression of the residue into cake.

In recent years the introduction of heating processes, and, more especially, the employment of chemical agents for the purpose of extracting the oil, have resulted in placing upon the market cakes which are very hard in consistency, close in texture, and poor in oil. It will usually be found in the case of linseed cakes that as the percentage of oil increases that of albuminoids diminishes.

No oil-cake is more liable to impurity and adulteration than linseed cake, and hence in purchasing this cake, farmers should insist upon having the consignment invoiced to them as "Pure Linseed Cake," or simply as "Linseed Cake." They should not be content with such phraseology as "95 per cent. pure," "made from 95 per cent. linseed," or "made from seed pure as imported." When a cake is invoiced as

"Linseed Cake," the vendor is bound under the Fertilisers and Feeding Stuffs Act to supply cake made from linseed alone and without admixture of other seed or substance. The term "Oil Cake" is very misleading, and may apply to cakes made from a variety of materials.

The chief kinds of linseed cake are English or home-made cakes, American, and Russian or Baltic.

Home-made cakes are usually fairly soft, and of late years they have been much freer from impurities than formerly, especially when sold under the designation of "Pure Linseed Cake." In regard to quality they usually contain 9 to 12 per cent. of oil, and may be looked upon as intermediate in richness between American and Russian.

American cakes are usually rather hard and poor in oil, but are correspondingly rich in albuminoids.

Russian cakes are darker in colour than American cakes. They are usually rich in oil but are sometimes rather impure.

*Rough Tests of Linseed Cake.*—A rough idea as to the purity and quality of a linseed cake may be obtained as follows:—

(1) By inspection with the aid of a pocket magnifying glass and a penknife one can detect the presence of substances other than linseed when these are of fair size. As a rule, however, they are so much broken up as to be difficult of identification. The smooth, shining, dark, generally more or less triangular-shaped seeds of *Polygonum* can often be seen. The round, dark-brown husks of rape seed are familiar. The seeds of corn cockle are dark brown and very rough on the surface. Corn spurrey is a black seed with an almost smooth surface and surrounded by a delicate disc. Pieces of straw can sometimes be detected, and also sacking from the bags in which the cakes are pressed.

(2) The presence of too much sand may be suspected if the cake feels gritty when small pieces are crushed between the teeth. The flavour should be pleasing and not pungent or bitter.

(3) A jelly may be made by mixing one part by weight of the cake with six parts of boiling water. The jelly should have a mild taste and should not be bitter or rancid. If the jelly be covered up and warmed gently for some time the

presence of mustard may be detected by the smell. Cakes resulting from the chemical process of oil extraction will not always form such a jelly. They are usually very poor in oil.

Linseed cake, like the seed, is highly valued for young or weakly animals, and is commonly regarded as unsurpassable for fattening cattle.

Although some other foods, or mixtures of foods, may produce as large an increase in fattening cattle, none has the same capacity for imparting "finish" and "touch." The best feeders, therefore, generally finish their cattle on a liberal allowance of linseed cake. Should the supply exceed about 4 lb. per head per day, however, the flesh and fat produced are liable to be soft and lacking in agreeable flavour. Similarly, if more than this amount be given to milch cows, the butter-fat tends to become unduly soft and to acquire a linseed-oil flavour.

Circumstances may arise in which it becomes desirable to use home-grown grain instead of purchasing linseed cake for the fattening of cattle or sheep. The following substances may be mixed in the proportions indicated and ground in an ordinary steel grist-mill:—

8	bushels	oats
4	„	barley (or maize)
2	„	peas
1	bushel	linseed

If this mixture be given to stock with an equal weight of ground decorticated cotton cake, the whole will approximate in composition to good linseed-cake.

*Cotton Cakes.*—Cotton seed, as it is gathered from the plant, is covered by a dense mass of long white cotton fibres. Cotton is removed from the seed by the process of "ginning," and when this is done the cotton seed has either a smooth, dark-brown hull or husk as in Sea Island and Egyptian cotton, or is covered by a dense greenish fuzz as in American Uplands cotton, or by a close ashy fuzz or velvet as in most kinds of Indian cotton. In the process of extracting the oil the kernels may first be removed from the hulls, or the hulls may be ground in along with the kernels. If the hulls are separated from the kernels we get decorticated cotton cake; if the hulls have not been removed we get undecorticated rough, or "English" cotton cake. The latter cake is usually



made from Egyptian or Indian seed, and the former from American seed.

*Decorticated Cotton Cake.*—This cake, when well made and in good mechanical condition, may be considered one of the most valuable foods at the farmer's disposal. Weight for weight, it contains a larger aggregate amount of valuable material than any other food, and, as a rule, can be obtained at a price which, in relation to its composition, is very moderate. Further, it yields richer manurial residues than any other food. At one time this cake contained as a rule 14 to 16 per cent. of oil, but the quantity of this ingredient has now dropped to about 8 or 10 per cent. Some degree of compensation for the comparative poverty in oil is the increased percentage of albuminoids, which range from about 40 to 50 per cent., but deficiency in oil is often associated with a cake that is hard and "knotty."

The average composition of decorticated cotton cake at the present time is about 40 per cent. albuminoids, 8 or 10 per cent. oil, and 20 per cent. carbohydrates. At ordinary rates this is one of the cheapest foods in the market, though it is not suitable for calves, lambs, or other young stock, unless given in small quantities, and in a finely ground condition. It is not suitable for pigs.

It is most economically employed for dairy stock or fattening cattle, and as a rule should be accompanied by about an equal weight of some starchy food like maize or barley. When fed in this way experiments have shown that this food may be usefully employed both for fat stock and dairy cows. Provided that it be not used too liberally, it is superior to linseed cake where first-rate samples of butter are required; it renders the butter firm and easily manipulated, and imparts good keeping qualities, and a high melting point; it is thus specially useful in hot weather. The very high quality of the manure made from this cake is a point that experienced farmers do not overlook. This cake is largely used in certain parts of the country, notably in Scotland; whereas in others it is rarely seen.

The chief points to be observed in purchasing decorticated cotton cake are :—(1) To ensure that the cake is made wholly from decorticated seed; (2) to see that it is in suitable con-

dition, and free from mould. With regard to the first point, the seed may not have been efficiently hulled, or the hulls may have been removed, ground up, and subsequently added to the meal, and the whole pressed into cake. Any appreciable quantity of coarse husks in the cake can be readily detected with the naked eye, but when the husks are present in a thoroughly disintegrated condition, their detection is only possible by chemical and microscopical examination. Cakes of this description exhibit a low percentage of oil (5 or 6 per cent., instead of about 10 per cent.), and a high percentage of fibre (10 to 12 per cent., instead of about 7 per cent.). Such cakes are intermediate in value between decorticated and undecorticated cotton cakes, and it is doubtful if sellers are justified in applying the description "decorticated" to some of the cakes now sold under that name. In view of the uncertainty attaching to the meaning of the term "decorticated" in this connection, purchasers of decorticated cotton cake should insist on a written statement from the seller as to the amount of fibre it contains.

The hard button-like pieces sometimes found in decorticated cotton cake are extremely objectionable. To produce a softer cake some manufacturers have lately adopted the plan of grinding up the cake and re-pressing it into shape, while in other cases it is put on the market in a ground condition, and is often known as "yellow meal." As impurities are not so easily detected in the meal as in the cake, it should be bought with greater caution. If the cake is only moderately hard, and can be passed conveniently through the breaker, it may be crushed and left exposed to the atmosphere for a few days, when it becomes softer and more suitable for stock. When exposed to the air in this way decorticated cotton cake becomes darker in colour, and it may also be noted that freshly-made cakes are much brighter than old cakes.

*Undecorticated Cotton Cake.*—Two classes of this cake are in common use, these being termed for convenience "Egyptian Cotton Cake" and "Bombay Cotton Cake." The chief difference between them lies in the greater proportion of woolly fibrous matter in the Bombay cakes. For this reason greater caution is necessary in using them than in the case of Egyptian cakes. Bombay cakes are, moreover,

usually rather poorer in albuminoids and oil, while they contain more sand, and are frequently "preserved" with borax. The average composition of the Egyptian cake may be put at about 23 per cent. of albuminoids, 5 or 6 per cent. of oil, and 30 to 35 per cent. of carbohydrates. The amount of fibre present is an important point; this is usually about 20 per cent., and should not rise much above that figure.

The most common faults of this cake are (a) the presence of too much cotton fibre, due to imperfect ginning of the raw seed; (b) excessive amount and coarseness of husk. After the ginning process there still remains attached to the husk a fine downy layer of cotton fibre, and this is extremely difficult to remove. Thus there is always a possibility that the seed will not be efficiently freed from such cotton, which can be easily detected by the woolly appearance of the cake when broken across. Coarseness of husk, and husk in excessive amount, are also serious objections, and have frequently been the cause of fatalities amongst stock.

The husk present in this cake possesses an astringent property which checks any tendency towards "looseness," and for this reason the cake is useful when fed along with laxative food, such as fresh young grass in the spring, and the aftermath or foggage of hay fields. In many parts of the country uncorticated cotton cake is the feeding stuff most commonly used during the grazing season.

The comparatively low percentage of oil and albuminoids, and the high percentage of fibre, render uncorticated cotton cake much inferior to decorticated cotton cake as a feeding material. Many experiments have been conducted with the object of contrasting the two kinds of cotton cake as foods for fattening cattle. The evidence thus furnished is entirely in favour of the decorticated cake, which, irrespective of its superior manurial value, was found to be worth £2 to £3 per ton more than the rough cake.

Uncorticated cotton cake is, nevertheless, a most valuable food, and is extensively used for milk cows and fattening beasts. It is not a suitable food for young animals.

*Soya Bean Cake.*\*—The soya, soy, or soja bean, has during

\* See also *Journal of the Board of Agriculture*, December, 1909, p. 735; February, 1910, p. 940; and other issues.



the past year or two entered somewhat extensively into farm economy as a feeding stuff, large quantities being imported from Manchuria. According to a number of analyses, the beans contain some  $35\frac{1}{2}$  to 41 per cent. of albuminoids,  $21\frac{1}{2}$  to 27 per cent. of carbohydrates, and  $15\frac{1}{2}$  to 18 per cent. of oil. The oil is extracted by pressure, and the residue forms the cake or cake-meal used for cattle feeding. This cake usually contains 41 to 45 per cent. of albuminoids, 25 per cent. and upwards of carbohydrates, and 6 to 8 per cent. of oil. Some of the cake and cake-meal which is being sold has had the oil extracted from it by means of a solvent instead of by pressure. In such cases only  $1\frac{1}{2}$  to  $2\frac{1}{2}$  per cent. of oil remains, and the proportions of albuminoids and carbohydrates are correspondingly higher.

Soy bean cake may be regarded as a useful feeding-stuff when given to stock in suitable quantities and in combination with other foods. It approaches decorticated cotton cake in composition, and should be fed in the same way as that cake with starchy foods, roots, hay, and straw. A further necessity for caution in its use arises from the alleged purgative tendency of the soy bean oil.

*Rape Cake.*—This cake is not now much used as a feeding stuff in this country, the objection to it being the frequent presence of mustard seed, and the disagreeable flavour that it imparts to milk. It is, however, a highly nutritious food rich in albuminoids, and, if care be bestowed in its purchase, it can be advantageously given to stock, especially sheep, as the experience of several successful farmers testifies.

*Cocoanut Cake.*—This cake represents the residue left after pressing out the oil from the fruit-kernel of the cocoanut palm. It is used far more extensively on the Continent than in Britain, and is by many highly esteemed for milking cows. When fresh it has a pleasant nutty aroma, but soon turns rancid or acid. It has a hardening tendency upon the milk-fat. It contains a considerable proportion of crude fibre (usually 12 to 14 per cent.), but this is fairly easily digested.

*Compound or Mixed Cake.*—The use of cake of this description is apparently on the increase, at least in certain districts. Frequently some material, like ground linseed or cotton cake, is taken as a basis, and the bulk is made up of ground cereal

grains, such as maize, barley, &c. As a rule, the mixture is flavoured and sweetened by the addition of spice, such as ground fenugreek or aniseed. Locust bean meal is also a favourite ingredient of these cakes, and of the mixed meals sold for lamb food and similar purposes. The sweet taste and pleasant aroma which accompany compound feeding cakes, and the high degree of relish with which they are consumed by cattle, largely account for their popularity amongst farmers. Many experienced feeders use large quantities of such cakes with the best results, but they should be bought with even greater caution than is necessary in the case of pure cakes. They furnish an opportunity of getting rid of material (such as musty cake, warehouse sweepings, &c.) that cannot readily be sold in any other way, so that the buyer of compound cakes has a special inducement to deal with a firm of high reputation, and frequently to take the opinion of an experienced chemist.

**BREWERS' GRAINS (or Distillers' Grains).**—This material is a bye-product of the brewing and distilling industries, and represents the residues of the grains (chiefly barley) which have been converted into malt and subjected to thorough extraction with water. Grains contain all the husk of the barley and also the bulk of the albuminoids, but the greater part of the starch has been removed.

On farms in the neighbourhood of the brewery the grains are used in the wet condition as removed from the "mash tun," but for purposes of transportation to greater distances they are dried by special machinery until the moisture-content has been reduced to 10-15 per cent., and are then sold as "dried grains."

Wet grains are used practically only for milking cows, and are believed to promote the flow of milk. The opinion is general, however, that the increased yield of milk is accompanied by a deterioration in the quality of the milk if more than very moderate amounts of wet grains be fed. These opinions have not yet been adequately tested by experiment, but they receive no support from the results thus far obtained. Wet grains rapidly ferment and become sour on keeping, and hence cannot be stocked in large quantities.

Dried grains have proved to be an excellent food alike for

fattening cattle, milking cows, sheep, and horses. They seem to have a special value for sheep, excellent results having been obtained with mixtures of dried grains and decorticated cotton cake.

**MALT DUST** (Malt Culms, Coombs, Combings, or Sprouts) consists of the sprouts rubbed off the dried germinated barley in its conversion to malt. It is a highly digestible and palatable food, but an appreciable proportion of the material that is digested consists of amides, organic acids, and other ingredients of low nutritive value. These ingredients impart to the food a sharp, appetising flavour, however, and the condimental effect thus produced is highly valued, especially for milking cows. This food is not suitable, however, for cows when approaching the time of calving.

**THE PULSE GRAINS.**—These include the various forms of beans and peas, all of which are rich in albuminoids. Apart from the soy bean they are poor in oil, ordinary beans and peas containing only about  $1\frac{1}{2}$  per cent. They are quite different in composition from the cereal grains, being much richer in albuminoids and correspondingly poorer in carbohydrates. The great estimation in which beans and peas, in the form of meal, are held for dairy cows is due to their richness in albuminoids and the beneficial influence which they exercise upon the quality of butter. Where it is intended to fatten cattle without cake or dried grains, some addition of beans or peas to the concentrated food is considered desirable by many farmers. These foods swell up considerably when soaked in water, and hence must not be fed dry in large quantities.

**THE CEREAL GRAINS.**—These include wheat, barley, rye, oats, and maize, which may all be grouped together as essentially carbohydrate, or starchy, foods. They contain roughly 60 to 70 per cent. of carbohydrates, 10 to 12 per cent. of albuminoids, and 2 to 5 per cent. of oil or fat.

The only class of stock to which wheat is generally given is poultry, and for poultry feeding it is unexcelled by any single food except, perhaps, short white oats.

Barley usually commands a price in this country that precludes its being profitably used as a food for farm stock. Inferior samples, unfit for malting, may be used for the same purposes as maize.



Oats are the staple concentrated food of horses, but may be replaced to some extent by beans, maize, barley, or mixtures of these grains. A mixture of beans and maize in the proportion of about  $2\frac{3}{4}$  of maize to one of beans, constitutes a food very similar in composition to oats, and may for general purposes be used as a partial substitute.

Maize is the most starchy food in the market, and is always most appropriately fed with a highly albuminoid food, such as decorticated cotton cake. As a concentrated food for general feeding purposes a mixture of equal weights of these two foods can hardly be excelled. The very small quantity of lime, and the low percentage of albuminoids in maize, largely account for its unsuitability as a food for young growing animals. When fed alone it also gives very unsatisfactory results as a poultry food.

**MILLING OFFALS.**—In the milling of wheat for the production of flour, a number of bye-products, commonly referred to as “offals,” are obtained, and these materials furnish an important class of farm foods. They represent the outer layers (other than husk) of the wheat kernel, and range in character from a coarse bran to materials rich in floury particles (“middlings”). There is considerable divergence in the grading of these offals in different parts of the country, but for general purposes they may be grouped into the three classes of bran, sharps (or shorts) and middlings, the last-named being the most like flour in character, whilst “sharps” are intermediate between this and bran.

These “offals” are extensively used upon the farm, the finer grades being mainly used for pigs, whilst bran is everywhere used for all classes of stock, exercising a mild laxative influence which considerably enhances its value.

**RICE MEAL.**—The material sold under this description should be a rice bran, free from rice husk. The latter is met with in commerce under the name of “rice hulls” or “rice shudes,” and so far from having any appreciable feeding value, has actually an irritating effect upon stock, owing to its richness in hard fibre (30 per cent.) and silica (18 per cent.). Its presence in rice meals, increasingly prevalent of late years, is therefore strongly to be deprecated. Genuine rice meal is a highly digestible food, rich in oil and starch. The oil, however, appears to be of low nutritive value compared with

the oils of oil-cakes. Practical experience with rice meal shows it to be best suited for pigs. It is one of the commonest ingredients of compound cakes, owing to its cheapness and richness in oil.

**TREACLE, OR MOLASSES.**—This is a substance which can often be very profitably employed. When of good quality it contains about 50 to 60 per cent. of sugar, and consequently has considerable feeding value, whilst it is much relished by cattle. When mixed with water, and used at the rate of a pound per head per day to moisten chaff, treacle is a very useful addition to a diet, especially when roots are scarce.

Molasses is now largely employed as a cattle food when absorbed by dried peat (moss litter) or by the pith of the sugar-cane. In this form the food is more convenient to handle than when in a liquid state. Care should be exercised, however, to avoid purchasing the convenience too dearly, where the absorbent material is highly indigestible.

A section of the Revenue Act, 1903, provides that molasses imported into Great Britain and Ireland shall not be liable to duty if intended solely for the purpose of food for stock.

**COD-LIVER OIL.**—Although cod-liver oil has not yet taken a place amongst the staple foods of the farm, the attention of farmers may be drawn to the fact that several practical experiments have been conducted, showing considerable success from the use of this substance as a food for calves. The function of the oil is to supply the place of cream when rearing calves on separated or skim milk. It is given to the calves after they are about six weeks old, and in quantities up to 2 oz. per head per day. Calves reared on separated milk and cod-liver oil do not gain in weight so rapidly as those fed on whole milk; but they will, if proper care be exercised, remain perfectly healthy, and they are reared at less than half the cost. It is a great advantage to continue to give the oil for some time after the milk has been stopped. The beef from animals fed in the early stages of their existence on cod-liver oil is in no sense inferior in quality to that from animals reared on whole milk. (*See also Leaflet No. 142, Calf Rearing.*)

**NOTE.**—In order to obtain an analysis of a feeding stuff which would serve as evidence under the Fertilisers and

Feeding Stuffs Act, a sample should be taken as required by the Fertilisers and Feeding Stuffs Regulations (*See* Leaflet No. 18) and a portion should be sent as required to the County Analyst. Preliminary information as to procedure can be obtained, if necessary, by addressing an inquiry to the County Analyst, and the assistance of an Official Sampler can be requisitioned. The fees payable vary in different districts.

## THE DISTRIBUTION OF THE "LONG LACTIC BACTERIA" OR LACTOBACILLI.

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THIS type of micro-organism—in French and English the so-called *Bacillus Bulgaricus* type—has been known to European bacteriologists for the last fifteen or twenty years, but an increased interest has attached to it in the last few years since Metchnikoff has recommended fermented milk containing such organisms as a common article of diet. The germs have been discovered and found to be the chief active principles in such fermented milks as "kefir," "yoghurt," "leben," "mazun," "gioddu," and "koumiss." It is found that these organisms can maintain themselves under the conditions present in the human intestines, and they are believed to have a beneficial influence in controlling injurious fermentations there. A great impetus has lately been given to the trade in fermented milks in many countries, and the bacteria are now supplied commercially in different forms, as in milk, tablets, sweets of various kinds, prepared cheeses, &c.

Probably the first to isolate organisms of this type was Beijerinck, who found in Russian "kefir" a long form of lactic organism differing in some important respects from the normal milk-souring bacteria, and which he termed *Lactobacillus Caucasicus*. Then in Egyptian "leben," Rist and Khoury found two types of lactic acid-producing bacteria differing in some respects from the type discovered by Beijerinck, yet possessing the same general characters. Later, Grigoroff isolated from Bulgarian "yoghurt" two distinct strains of lactic bacilli with close resemblances to the types already discovered. One of these he termed



*Bacillus Bulgaricus*, a name at present very generally applied to such "long lactic" organisms. Also in Armenian "mazun," Dioggoli discovered a germ of similar characters; and in Sardinian sour milk "gioddu," Grixoni observed a long lactic type of organism.

All the cultures of long lactic bacteria obtained by different workers from the various fermented milks possess the same general characters, and such bacteria form a distinct group. Löhnis\* has classed them in the *Bacterium caucasicum* group, and has lately† adopted the term "*lactobacilli*," formerly used by Beijerinck, and for various reasons this term is preferable to "long lactic bacteria," "*B. Bulgaricus* type," &c.

White and Avery‡ have isolated different varieties or strains of this type. They have made a comparative study of a large number of cultures of lactic acid-producing, milk-curdling bacteria from many countries, all originally isolated from Oriental fermented milks. Their results justify Löhnis's classification, and show that every culture studied must be included in the *lactobacilli* group.

The general conclusions arrived at by these investigators as to the characteristics of the bacteria of this group—the so-called *Bulgaricus* type—may be summarised as follows: All the strains show wide variations in size and are much larger than the ordinary milk-souring bacteria. They may vary in length from  $2\mu$  to  $50\mu$  and are about  $1\mu$  broad. The bacteria of this group are difficult to cultivate; growth in most media is feeble, and often obtainable only in media containing milk or whey, or in milk. Milk is the most favourable medium for growth. The optimum temperature for growth is much higher than in the case of the ordinary lactic organisms, being  $113^{\circ}$  F. or  $115^{\circ}$  F. Milk is coagulated in eight to eighteen hours at  $112^{\circ}$  F. Such organisms produce a much higher degree of acidity in milk or whey than the normal milk-souring bacteria.

Grown in whey agar all the strains show the following cultural characters: They grow equally well under aerobic

\* *Gruppierung der Milchsäurebakterien*, *Centralblatt für Bakter.*, Bd. 18, 1907.

† *Handbuch der Landwirtsch. Bakteriologie*, 1910.

‡ *Centralblatt für Bakter.*, Bd. 25, 1909.

and anærobic conditions. They are all non-motile and non-sporogenous. They have a tendency to chain formation and to show involution forms. The cell body is often seen to contain a varying number of round to oval bodies or granules. The colonies in whey agar vary in appearance from a round to an irregular, curled, filamentous structure, with periphery mostly filamentous and often streaming, but in a few cases smooth and even. It is believed that milk is the natural habitat of the bacteria of this particular group, and that growth in the human intestines follows only upon internal administration by consuming fermented milks.

According to Hastings and Hammer,\* bacteria of this type form a supposedly *new* group of organisms. As far as they are aware, no one has supposed that these organisms are commonly present in milk. While Freudenreich has found them widely distributed in Swiss milk, Swiss cheese, and whey rennet, they are not aware that they have been found elsewhere in market milk.

By microscopic examination of milk incubated in stoppered bottles at 37° C. for several days until a higher degree of acidity was obtained than was sufficient to suppress the bacteria of the common lactic streptococci type, these investigators found long slender cells appearing, which increased in numbers with increasing acidity until they were the predominant form. They found isolation of such long forms difficult, and possible only by making repeated inoculations from milk with a high acidity. By such methods they found the lactobacilli type of bacteria to be widely distributed in American milk and in American butter and cheese.

They point out, however, that in Conn's latest classification of dairy bacteria no such organisms are described, and conclude that this class of bacteria, though undoubtedly characteristic of milk, has eluded the search of American bacteriologists, and to a great extent of European bacteriologists also, because the methods employed have not been such as to attract attention to them; and that nothing is definitely known as to the natural habitat of the organisms. They believe that the significance of this group of bacteria

\* *Centralblatt für Bakter.*, Bd. 25, 1909.

is unknown, and it seems doubtful whether they have any rôle in the ripening of Cheddar cheese comparable to that they are supposed to play in Emmenthaler cheese.\*

They conclude that on account of the wide distribution of this class of organism in dairy produce in America there is always opportunity for the digestive tract of man to become seeded with them; that there is no evidence that they are found in human fæces except when consumed in large numbers in fermented milks; that it is evident the organisms do not find a favourable condition for growth in the alimentary tract, and will not be an important factor in the intestinal flora of man.

White and Avery also obtained their cultures of lactobacilli from milk only; and they also came to the conclusion that milk alone is a suitable medium. There are, however, different publications in German literature † which show that the so-called lactobacilli must be common in nature.

As growth of this type is slow in the media commonly employed in the bacteriological laboratory different workers have attempted from time to time to find a special medium better adapted for the cultivation and isolation of bacteria of this class. Cohendy has found that an extract of malt in the medium is more favourable to their growth. Heinemann and Hefferen,‡ working at about the same time as White and Avery, and previous to Hastings and Hammer, cultivated them successfully in a special medium of agar containing 5 per cent. glacial acetic acid and 2 per cent. glucose. They proved lactobacilli to be present normally in human fæces, fæces of cows and horses, in various fermented and aromatic foods, cattle foods, saliva, normal gastric juice, various fermented milks, ordinary market milk, and in soil, manured or unmanured. They believe that these organisms are widely distributed in nature and are identical with *B. Bulgaricus*, *B. Boa-Oppler*, *B. panis fermentati*, and other bacteria supposed to belong to the class of acid-producing organisms of the mouth and intestines. This is the same conclusion as that of Löhnis.||

\* In the manufacture of Emmenthaler cheese, lactobacilli are employed as a starter.

† See Löhnis's *Handbuch der Landwirtsch. Bakteriologie*, 1910.

‡ *Centralblatt für Bakter.*, Bd. 25, 1909.

|| *Idem*, Bd. 18, 1907.



Rubinsky furnished an important contribution to the subject in a report of his studies of koumiss.\* In his exhaustive examination of this fermented milk, he found that milk containing extract of yeast was a very suitable medium for such long lactic bacteria as exist in koumiss.

The present writer, being specially interested in dairy bacteriology, and doing bacteriological work in Dr. Löhnis's laboratory in Leipzig, took advantage of the opportunities offered him to investigate, as far as the time at his disposal permitted, the distribution of these long lactic forms—lactobacilli—to find out, if possible, whether their main sphere of activity was confined to the above mentioned fermented milks, or to confirm the results of Heinemann and Hefferen, who found them to be very generally distributed.

The medium employed was "yeast whey," a modification of the yeast milk recommended by Rubinsky, and was prepared as follows: 100 grams of yeast were added to 100 c.c. of water, and this was heated in the steamer for from thirty to sixty minutes, and filtered three times. The filtrate was made up to 100 c.c. with water. To one litre of fresh separated milk at 35° C. was added a little rennet extract. After curdling this was stirred and heated to 70° C. and filtered. To the filtrate or whey 1 per cent. of peptone, 5 per cent. of common salt, and 10 per cent. of yeast extract were added. The yeast whey was subsequently sterilised in the steamer in the usual manner. The yeast whey so prepared was found to be a better medium for the purpose than Rubinsky's yeast milk. Being transparent it admitted of direct microscopic examination of the different cultures at different periods of incubation, and of direct observation of the relative growth of lactobacilli in the cultures.

Sterile tubes of this medium were inoculated with the substances to be examined and incubated at 38° C. for several days, or until bacterial growth was distinctly apparent. Other tubes of yeast whey were inoculated from the first cultures and incubated in a similar manner. When microscopic examination had proved the long forms to be present in considerable numbers, plate cultures were made with whey agar and chalk. The lactobacilli were in this way isolated with comparatively little difficulty.

\* *Centralblatt für Bakter.*, Bd. 28, 1910.

The substances examined included—

Leipzig ordinary market milk.

Swiss Emmenthaler cheese.

Deutsche cheese, Thüringer Stangerkäse.

Cheddar cheese, from Scotland.

Sauerkraut.

Human saliva.

Fæces of cows.

Soil.

The lactobacilli were proved to be present, in larger or smaller numbers, in each of the substances examined.

The medium employed seemed to encourage the growth of the long forms, lactobacilli, relatively to other types. In all cases microscopic examination of the yeast whey cultures showed that the number of lactobacilli present, relative to other types, was increased in the second culture of yeast whey, which thus formed a very effective enriching medium for this type of bacteria. In some cases the colonies of lactobacilli were almost the only ones to be observed on the Petri plates; and in some cases the colonies were clearly visible to the naked eye, along with a well-marked transparent zone due to the dissolving of the chalk, after twenty-four hours' incubation at 38° C. In other cases acid production was less rapid, and the dissolving of the chalk appeared only after several days.

Subsequently the presence of lactobacilli in comparatively large numbers in the original substances, notably in ordinary market milk, was proved in many cases by direct microscopic examination. Indeed, germs which had previously, in microscopic examination, been taken for other long forms, proved on a closer acquaintance to belong to the lactobacilli group; and such bacteria were found to be far more common than is generally supposed.

Lactobacilli were found growing in colonies quite different in appearance and outline in almost every gradation from the irregular, filamentous structure—branched colonies—to the common round, or oblong, or lobed colony. This tends to confirm the conclusions of other workers.\* The form of the organism also varied from the ordinary short rod to the long

\* Löhnis, *Centralblatt für Bakter.*, Bd. 18, 1907; Rubinsky, *Idem*, Bd. 28.

forms more commonly associated with the lactobacilli. It would seem that the form of the colony is in some respect determined by the form of the organism, and that this in turn is dependent upon the conditions of growth. Thus the more filamentous and spreading colonies were found to contain lactobacilli of the longer forms, and *vice-versâ*.

It would seem, therefore, that micro-organisms of the lactobacilli type are widely distributed in nature; that they occur normally almost everywhere where mixed bacteria are generally found, as in soil, air, water, foods of different kinds, milk, and other dairy products, in the alimentary tracts of human beings and animals, in human and animal fæces, &c.; that the natural habitat is not, as is commonly supposed, milk, but more especially the intestines of animals. They find there exactly the conditions to which they have become adapted, *i.e.*, a comparatively high temperature, diminished air supply, and association with other types of organisms, particularly yeasts. But the intestines of an animal consuming milk are, no doubt, a better breeding-ground for them than those of an animal which does not partake of milk. This is borne out by the greater numbers which are found in the fæces of infants and young animals on a milk diet. It is interesting to note in this connection that soured milk beverages have in olden times been prepared from goat's milk by the addition of pieces of calf's stomach. The lactobacilli, however, are present normally in numbers also in the mouths of older persons and animals, and are probably in no case entirely absent from the intestines.

The presence of such micro-organisms in dairy produce has undoubtedly a practical significance of great importance, but time has not yet permitted further investigation into this matter. The Cheddar cheese examined was a well-matured, first-class Scots Cheddar of superior flavour and general characters, and it is worthy of note that the lactobacilli were present in great numbers, in large colonies, and were by far the most numerous of the different forms of bacteria present. This was confirmed by direct microscopic examination. It would seem that the conditions present in a comparatively large Cheddar cheese during ripening—practically anaerobic conditions—are favourable to the growth of



this type. It is probable that this type of germ has some important part to play in the ripening processes, and that it has an important influence on the quality of the cheese, as in the case of the Swiss Emmenthaler.

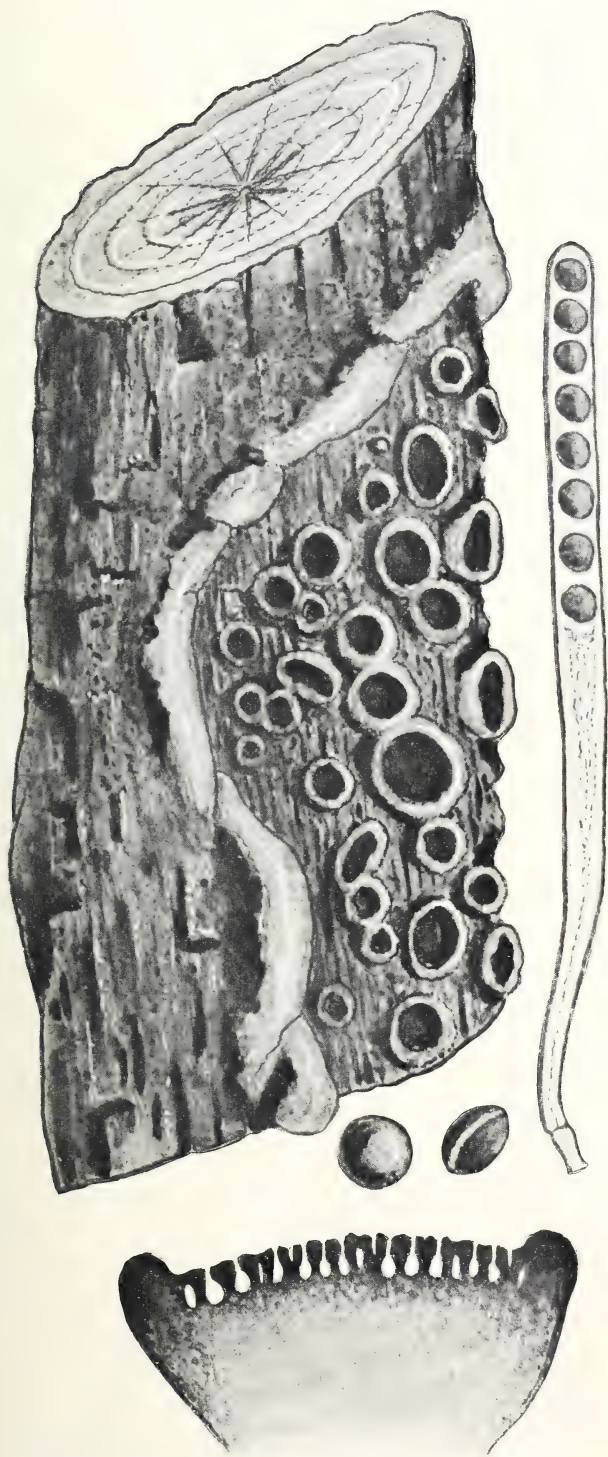
Indeed, some claim to have observed that the practice of applying farmyard manure to pasture is conducive to the production of Cheddar cheese of the best quality; while, on the other hand, the application of artificial fertilisers only is held to be responsible in some measure in some cases for an increase in the number of inferior cheeses.

While the introduction into milk of bacteria conveyed in cow excrements is to be deprecated, the judicious use in Cheddar cheese-making of a milk starter prepared from a culture of germs of the lactobacilli type, will be found to have a beneficial effect on the quality and dietetic value of the product. Lactobacilli cultures are now readily obtainable, with full directions as to cultivation, and the resulting starter may be safely used in the same way as an ordinary lactic starter, at the rate of not more than '25 or '3 per cent. of the whole milk. Such a starter has been used with good results. It is probable, however, that a starter containing both lactic streptococci and lactobacilli would prove equally, if not more, effective; and this will be a matter for further investigation.

## BLISTER-CANKER OF APPLE TREE.

(NUMMULARIA DISCRETA, TUL.)

THE genus *Nummularia* is cosmopolitan in its distribution, and generally occurs under the form of black, hard, crust-like patches on dead bark or wood. These patches are usually quite flat, and more or less circular in outline, hence the generic name. *N. discreta* is readily distinguished from other species by the thick raised edge surrounding each patch or fruit-body, and by the compressed, circular, dark brown spores with an equatorial paler line. It occurs in France, Germany, Italy, United States, and Cuba, and was first met with in this country during the past year, on the fallen branch of an apple tree, at Sandsend, near Whitby, Yorkshire. As a rule the fungus is a saprophyte on various trees, as elm, magnolia, Judas tree, apple, &c., and is not recognised in



BLISTER-CANKER OF APPLE TREE.  
(*Nummularia discreta*, Tul.)





Europe as a dangerous parasite, but in the Mississippi Valley apple-growing region of the United States it is a constant source of danger as a true parasite. The disease is usually found upon the larger branches, and, the mycelium being perennial in the tissues, a wound once formed continues to increase in size, until eventually the branch breaks away at the wounded part, and in many instances the entire tree is killed outright.

The first indication of infection is a brown and more or less sunken appearance of the bark in patches, which are usually scattered over a considerable area. These patches eventually become dry, cracked, and blackened, and the black fruit bodies of the fungus appear, at first as small globose bodies, which gradually expand into shallow saucer-shaped structures with a thick raised margin. Eventually the dry, dead bark falls away, but the fruit bodies of the fungus remain firmly attached to the wood. The mycelium present in the wood gradually encroaches on the surrounding healthy parts from year to year, hence the canker continues to increase in area until the branch is completely girdled and consequently dies.

The fungus is a wound parasite, and as spores are produced by the fruit-bodies in great abundance, the chances of infection through wounds caused by atmospheric agencies, birds, insects, &c., are unlimited.

Owing to the fact that this fungus has proved so destructive to apple trees in the United States, it is imperative that it should be removed and destroyed when met with in this country, as judging from analogy a fungus that has hitherto been known only as a harmless saprophyte, may at any moment become a dangerous parasite.

There is reason to believe that in agricultural districts considerable ignorance prevails with regard to the precautions which are necessary for the safe working of steam engines and boilers.

**Precautions for the  
Safe Working of  
Steam Engines  
and Boilers.**

Every year serious explosions from these engines and boilers occur, through which there is loss of life or

injury to persons, and frequently damage to property.

To ensure safety in the working of engines and boilers it is necessary that they should be regularly examined by a thoroughly competent person who is able to detect defects and to fix a safe working pressure for the boiler.

The best method of securing this is to insure the engine and boiler with a reliable boiler insurance company who will undertake the periodical inspections, and will advise on all necessary repairs, and on the precautions to be followed in working the boiler. The person who is placed in charge of the boiler should understand the danger of tampering with any of the safety fittings.

It should also be remembered that under the Boiler Explosions Acts, the Board of Trade order inquiries into all explosions from boilers, and in cases where they consider it necessary, public formal investigations are held.

The Courts holding these investigations have power to censure any party who is held to blame in connection with the explosion, and to order him to pay the whole or part of the costs of the enquiry. This power is frequently exercised.

Most of the serious explosions which have occurred from agricultural boilers have arisen through the working of old or second-hand boilers which have not been properly inspected and tested for some time previously; or through the safety valve being weighted or screwed down so that the boiler was worked at a much higher pressure than it could withstand.

A case of this kind occurred recently on a farm at North Lopham, Norfolk, and in the course of the investigation by the Commissioners of the Board of Trade it transpired that the engine had been worked by a former owner after he was warned by an engineer who conducted some repairs that the boiler was unsafe, and that on one occasion afterwards it had been worked at high pressure in a crowded sale-yard. Evidence was also given showing that it was not customary to have boilers examined for purposes of safety.

The Commissioners found that the explosion occurred owing to the weakness of the side of the firebox, due to wasting by extreme corrosion, the thickness of the metal at the line of fracture being simply that of a knife edge. They censured several persons whose conduct in connection with the boiler came within the scope of their report, and expressed the view

that the result of the inquiry indicated utter recklessness in the management of boilers. The individual held to be mainly responsible was ordered to pay £20 towards the costs and expenses of the Formal Investigation, the Commissioners stating that it would be well that persons dealing with dangerous articles like boilers should realise that they have no right to use them so as to endanger life.

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THE ninth International Agricultural Congress was held this year from May 1st to 8th, at Madrid, under the distinguished patronage of His Majesty the King of Spain. These Congresses are attended by official representatives of many of the principal countries of the world, and afford valuable opportunities for the discussion of economic and scientific questions relating to all branches of agriculture, and for the interchange of views based on experience as to the best means of promoting the development of the agricultural industry. Great Britain was represented on this occasion by Sir Thomas Elliott, K.C.B., Secretary to the Board of Agriculture and Fisheries, and by Mr. T. H. Middleton, Assistant Secretary in charge of the Intelligence Division. The Congress was attended, apart from the Official Delegates, by a very large body of farmers and others to the number of upwards of a thousand, of whom Spaniards formed probably two-thirds. The enthusiasm with which the Congress was received, and the interest which it created in Spain were largely due to the labours of the Comte de Montornés, who, as President of the Committee of Organisation and *Rapporteur général* to the Congress, was untiring in his efforts to make it a success. It was to his initiative that the Congress owed not only the hearty support of the Spanish Government, but also the attendance of large numbers of representatives of the agricultural societies of Spain, which contributed so greatly to the success of the meeting. Agriculturists, not only in Spain, but everywhere else, are greatly indebted to him for the ability and public spirit which he

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\* A further notice on this subject will appear in a subsequent issue of this Journal.



brought to bear on the discharge of the duties which he had undertaken on their behalf.

The Congress was opened on May 1st by His Excellency Don Rafaël Gasset, the Minister in charge of the Spanish Department of Agriculture, and was favoured by an address by M. Méline,\* a former President of the Council and Minister of Agriculture in France. M. Méline, after referring to the progress of agriculture during the past quarter of a century, dealt with the problem of rural depopulation, with which his name is chiefly associated, and also with the shortage of agricultural labour which is noticeable in many parts of Continental Europe.

After the opening meeting, the work of the Congress was distributed among eight sections, each of which dealt with a different group of subjects, classified as follows:—(1) Economics, which included rural depopulation, agricultural education, co-operation and credit; (2) Statistics; (3) Surveys; (4) Forestry; (5) Viticulture; (6) Fruit culture, including the cultivation of the orange, lemon and olive, and also diseases of fruit trees; (7) Breeding of live stock; and (8) Manures.

On May 7th the Congress was brought to a close by a meeting at which His Majesty the King of Spain was present. After the presentation of reports on the resolutions of the Sections, and other business, His Majesty was pleased to express, in moving terms, his recognition of the labours of the Congress.

One of the subjects discussed at the Annual Conference of the National Federated Associations of Fruiterers and Florists, held at Manchester on May 16th, 1911, was the packing and grading of fruit, and the following recommendations were made with regard to the packing of apples and broccoli:—

**Packing and Grading  
for Market.**

**APPLES.**

*Packing.*—Apples should not be purchased except packed in  $\frac{1}{2}$  cwt. boxes of the same type as those used in California, with the name and address of the sender, the net weight of

\* M. Méline himself was unable to be present owing to illness, and the address was read by M. Henri Sagnier.

the apples and the name of the apples marked on each box.

*Grading.*—Preference will be given, in purchasing, to packers or growers who grade their apples as “Firsts,” “Seconds,” and “Thirds,” or roughs. The mark “firsts” should mean that the apples are even-sized, clean-skinned apples of the same colour.

For “dessert” the apples marked “Firsts” should be not less than  $2\frac{1}{2}$  in. in diameter.

For “cooking,” “Firsts” should not be less than 3 in. in diameter.

*Varieties.*—The best marketable varieties to grow are:—

*For Dessert.*—Cox’s Orange Pippin, Worcester Pearmain, Ribston Pippin, Blenheim Orange.

*For Cooking.*—Bramley’s Seedling, Normanton Wonder, Lord Derby, Lord Suffield, Lane’s Prince Albert.

#### BROCCOLI.

*Packing.*—Broccoli will not be purchased unless packed in even dozens, in non-returnable crates, after the French type.

A crate should contain two dozens, and the name and address of the sender and the number of broccoli should be stated on each crate.

Preference will be given in purchasing to growers who trim their broccoli properly before packing.

*Grading.*—Preference will be given in purchasing to growers who grade broccoli “Firsts,” “Seconds,” and “Thirds,” or roughs, and who give under “first” grade close compact heads free from blemishes and of uniform size.

A party of Scottish agriculturists recently visited Australia at the invitation of the Government of the Commonwealth,

Egg Laying  
Competitions  
in Australia.

for the purpose of reporting upon rural conditions in that country. An interesting Report on the tour has now been issued (Blackwood: price 1s.), which,

in addition to a general description of the agricultural features of the various districts visited, contains much valuable information for the intending settler as well as an account of the methods of stock and sheep farming, wheat growing, dairying, and of the poultry, fruit, and wine industries.

In dealing with the poultry industry, reference is made to the well-known laying competitions which have been carried on for a number of years under Government supervision in each of the six States. The competitions date from 1901, and usually extend over twelve months. Apart from their value as a means of building up an egg-producing strain of fowls, which is the object their promoters have in view, they afford evidence of the average yield of well-bred birds, and indirectly of the "profit" or surplus receipts from the sale of eggs over the cost of food. As an example of this, the following table may be given, showing the results of some of the twelve-months' competitions in different States:—

	No. of birds.	No. of eggs laid.	Average No. of eggs per hen.	Cost of food per hen. <i>s. d.</i>	Net profit per hen. <i>s. d.</i>
New South Wales ... ..	360	63,318	173	7 0	10 2
Queensland ... ..	168	30,543	181	4 8½	10 1½
South Australia ... ..	450	80,959	179	5 4	6 4
" Tasmania " ... ..	678	126,133	186	5 6	8 4
Tasmania ... ..	168	27,106	161	6 9	9 2½
Western Australia ... ..	288	50,788	176	6 8	13 3

The average production over all these competitions was about 175 eggs annually, which, considering the number of birds entered, is a very high figure. The winning pens, comprising 6 birds each, accounted for very much larger numbers, the figures in four competitions being 232, 222, 255, and 254 per hen. In fact, it is stated that for breeding purposes, very little value is attached to a bird whose score falls under the 200 standard. From 220 to 240 the birds are considered useful, while when yielding above this number they become valuable. Individual scores of 270 and 280 are not unknown. It is from the best performers in this severe test that the stock birds for the ensuing season are chosen. The same care is taken in selecting the male bird.

These egg competitions are a distinctive feature of Australian poultry-keeping, and they have exercised a great influence on its development, particularly by fostering the commercial or utility aspect of the industry in preference to the production of exhibition stock. Utility strains, while maintaining the type and general characteristics of the breeds, are most carefully bred with a view to the progressive improvement of egg production, and there appears to be evidence that



this practice of careful selection has improved the production of several breeds, particularly white Leghorns. The assistance of the State in this direction has been of great value, and its supervision not only assures perfect fairness to the competitors, but gives to the tabulated results the stamp of official accuracy.

A two years' competition was held in New South Wales in 1906-8, which was won by a pen of 6 Langshans, with a score of 2,487 eggs, or 414 eggs each in two years. A three-years' test also was completed in March last, the object being to show the difference in egg production in the first three years of a hen's life. The results of the two completed years showed that the eggs produced in the second year were about one-fourth less than in the first year, the forty hens competing averaging 140 eggs per bird, as against 190 eggs in the previous year.

The sum shown as profit in these competitions represents the actual return obtained from the sale of the eggs, less the cost of the food, but nothing is charged for labour or for interest on capital. It is considered, however, that in the ordinary conditions in which poultry are kept in Australia, there is but a small expenditure on plant, while the labour would be done by the ordinary staff without extra expense. Moreover, birds at liberty gather a fair proportion of their own food from stubbles, pasture fields, and orchards, and the consequent reduction in the cost of food, together with the value of their manure may be put against the interest and labour.

The Board have been furnished by the Commissioners of H.M. Woods and Forests with the following account of the

Report on the State  
Experimental Forest  
at Inverliever.

progress of the work on the Inverliever Estate during 1910:—

Time and labour did not permit of much attention to the existing woods.

Work was confined to the conversion of fallen trees, and of a few oak trees into fencing material for estate purposes, and to the clearance of dead wood and scrub in the old mixed wood adjoining last year's planting.

About 169 acres were newly planted during the season, in addition to replacing the casualties in last year's work. In all 664,100 plants were put out, of which 287,000 were purchased and 377,100 taken from the nursery at Ford. They consisted of 107,970 larch, 44,100 Scots pine, 362,450 spruce, 12,800 Sitka spruce, 10,880 Douglas fir, and 16,000 silver fir, planted on new ground, and 15,000 larch, 45,600 Scots pine, 40,000 spruce, 1,300 Sitka spruce, 7,000 Douglas fir and 1,000 silver fir put out where the previous year's planting had failed. The planting season was not very favourable, although the winter was not severe. The prolonged drought, combined with the north-east winds, have seriously affected the young plants, and will, it is feared, cause a high death-rate.

The area to be planted was thoroughly cleared of bracken, rushes, and other growth in the early summer, and where necessary was drained. More draining was required than in the previous year, and in one very wet place, about one acre in extent, the plants have been planted in the inverted sods taken from the drains.

Every effort was made to kill all rabbits inside the enclosure before the planting season. To prevent their ingress, as well as that of hares, practically the whole block has now been enclosed with wire netting. The result has been very satisfactory. Black game have again played havoc with the young plants, although men were regularly employed in trying to drive them away. They were more numerous than last year.

The area planted last season has been cleared wherever the growth threatened to suppress the young plants. The bracken has been cut over part of the ground to be taken in hand next season.

The nursery at Ford has been extended to its limit, and the whole is enclosed with rabbit-proof netting. Part of the new ground was cultivated in the summer and cleaned, and has since been filled with young plants; the remaining part is still too foul and will be cultivated and cleaned this season. In all, 431,000 seedlings have been lined out, of which 215,000 were purchased and 216,000 taken from seed-beds in the nursery. They consist of larch 108,200, Scots pine 65,700, spruce 180,700, Sitka spruce 40,300, Douglas fir 19,600, and

silver fir 16,500. It was not possible to obtain sufficient labour to permit of transplanting all the seedlings from the seed-beds. Purchases of seed were confined this year to European and Japanese larch and common Sitka spruce.

In February of this year the Board's attention was directed to a case in which seed alleged to be *Trifolium parviflorum*, Ehrh., had been offered as white clover (*Trifolium repens*, L.). On examination of samples at Kew the identification of the seed as *T. parviflorum* was confirmed. The plant, which is a native of Central and Southern Europe, is an annual and comparatively worthless. One of

**Sale of  
a Weed Seed  
as White Clover.**

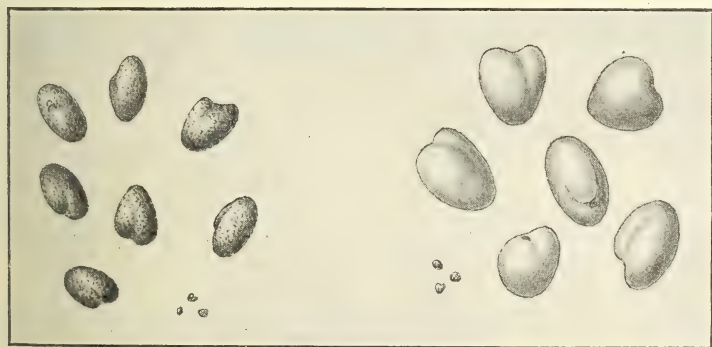


FIG. 1.

FIG. 2.

Fig. 1.—*Trifolium parviflorum*, nat. size and  $\times 7$ . Fig. 2.—*Trifolium repens*, nat. size and  $\times 7$ .

the Board's inspectors was directed to make inquiries into the matter with a view to proceedings under the Merchandise Marks Act, and samples obtained by him, which were offered as *Trifolium repens*, proved to be *T. parviflorum*, but the circumstances were not such as to make a prosecution under the Merchandise Marks Act possible.

The facts which transpired in connection with this case, however, show clearly that great care should be exercised by farmers and seedsmen when purchasing seeds about which there can be any doubt. White clover seed has been scarce this year, and misdescription or adulteration might consequently be exceptionally profitable. The Board are informed that *T. parviflorum* has been offered at the price of genuine



white clover by an Austrian firm, a Hungarian firm, and an English firm. The seeds of the two species so far resemble each other that a purchaser might well be deceived unless a careful comparative examination were made, and in one instance known to the Board where *T. parviflorum* was offered to a wholesale seeds merchant for *T. repens* the difference was not at first recognised. In the circumstances it seems desirable that large quantities of white clover seed should only be purchased on a warranty, and after examination by an expert. The following observations, however, on the differences between the seeds of *T. repens* and *T. parviflorum* may be useful to purchasers of small quantities of seed or those who are obliged to rely on their own judgment:—

The seeds of *T. repens* are glossy, perfectly smooth, and rather variable in size, averaging about 1·5 mm. in length by 1·25 mm. broad (1/17 in. by 1/20 in.). They are irregularly heart-shaped, and pale golden yellow in colour when fresh and well harvested, though yellowish-brown seeds are commonly present, and a few seeds may be canary-yellow, while immature seed is greenish-yellow, and old seed may change to bright, or even dark red. Many of the seeds may show a distinct want of plumpness.

In the case of *T. parviflorum* the seeds are dull, completely covered with minute raised tubercles easily seen with a lens, and are fairly uniform in size, but much smaller than *T. repens*, being about 1 mm. long by 0·75 mm. broad (1/25 in. by 1/34 in.). They are, further, irregularly heart-shaped, and a sample recently examined was very variable in colour, some seeds being yellow or canary yellow, others reddish-yellow, light or dark green, or even black. They were also of a fairly even plumpness.

The illustration shows to some extent the difference between the two species of seeds.

A leaflet (No. 184) dealing with red, white, and Alsike clover can be obtained, post free, on application to the Secretary, Board of Agriculture and Fisheries, Whitehall Place, S.W. An article dealing with "White and Alsike Clover Seed and their Impurities" was issued in this *Journal*, April, 1906, Vol. xiii., p. 7.

The following note on the actual yield of a cherry orchard in Kent has been supplied to the Board by Mr. C. H. Hooper :

**The Yield of a  
Small Mixed Orchard  
in Kent.**

The following is a record of yields and prices of fruit for twenty-nine years (1882 to 1910) from a grass orchard chiefly planted with cherries at Sheld-

wich, near Faversham, Kent. From this orchard are sent some of the best cherries that enter Covent Garden, and they are, in addition, carefully sorted and packed. In the opinion of the owner, the prices received represent the average prices obtained for good quality fruit from this district.

The area of the orchard is  $4\frac{1}{4}$  acres, on loam over clay over chalk. The trees, which were mostly mature at starting, consist of 97 cherries, 61 apples, 27 pears, 96 plums, 2 quinces, 2 walnuts, altogether 285 trees, or 67 trees per acre. In the hedges surrounding the orchard there are about 50 damson trees.

The total net return from salesmen in Covent Garden in twenty-nine years is £1,762 6s. 5d., an average of £60 15s. 5d. per annum, or £14 6s. per acre. The owner says that, in addition, the value of fruit consumed by his household has been about £7 yearly, and he has received about £3 yearly for the grazing of the orchard by sheep.

*Cherries.*—The 97 cherry trees (several of which have been regrafted during the period with the best market varieties) have yielded 6,287½ half-bushels of 24 lb., selling for £1,584 6s. 5d., the average annual yield thus being 217 half-bushels, realising £54 12s. 8d., or 11s. 3d. per tree. The yield has varied from 18 half-bushels, selling for £5 8s. 6d. in 1910, to 553 half-bushels, selling for £112 8s. 3d. in 1901. The price has varied from 2s. 6½d. per half (1¼d. per lb.) in 1909 to 8s. 6d. per half (4¼d. per lb.) in 1897, the average price for the period being 4s. 10d. per half, or 2½d. per lb.

*Apples.*—The 61 apple trees have yielded, in twenty-four years, 2,133 half-bushels, selling for £211 17s. 6d., an average of 89 halves, or £8 16s. 6d. per annum, or nearly 3s. per tree per annum. As in the case of cherries, the variation in yield is very great. For instance, in 1885, the yield was insignificant (only 3 half-bushels), while in 1902 it was 273 halves, selling for £36 7s. 6d. The price per half-

bushel varied from 1s. 6d. in 1891 to 3s. 6d. in 1890. The average price per half-bushel for the 24 years is 1s. 11 $\frac{3}{4}$ d.

*Pears.*—The 29 pear trees in 22 years yielded 1,009 halves, selling for £93 12s. 3d., an average per tree of 3s. yearly. The maximum yield was 230 halves, selling for £18 5s. in 1909. The price varied from 1s. 6d. per half-bushel in 1893 to 2s. 11d. in 1889; average price for the 22 years, 1s. 10d. per half-bushel.

*Plums.*—The 96 plums yielded in 12 years 436 halves, value £47 12s., an average of 36 halves per annum, selling for 79s. 4d. The maximum crop was 137 halves in 1908, selling for £10 9s. 6d. The price varied from 1s. 1 $\frac{1}{4}$ d. per half in 1909 to 3s. 4d. in 1884, the average for the 12 years being 2s. 2d.

The two walnut trees in 29 years yielded 659 half-bushels, selling for £66 10s. 6d., average of nearly 23 halves per annum, selling for £2 5s. 9d. The largest yield was 48 halves, which fetched £5 4s. 6d. in 1897. The price varied from 1s. 1 $\frac{1}{4}$ d. per half in 1909 to 3s. 4d. in 1884, average price for the 29 years 2s. per half-bushel.

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The Board desire to draw the attention of farmers and residents in rural districts to the following circular which has been issued by the General Post Office, explaining the advantages of the rural telephone system, and the terms on which telephones can now be provided in rural districts:—

**Telephones in  
Rural Districts.**

Residents in rural districts are apt to think that a telephone is a luxury of town life which it is impossible to enjoy in the country except at a high cost. This is true if each person requires a separate exchange line, consisting of two wires over the whole distance between the exchange and his residence, to be provided for his exclusive use, but such a line is not necessary in order to enjoy most of the advantages of the telephone service. If a sufficient number of subscribers living on or near a country road leading to a town where there is a telephone exchange will agree to use one line, they can telephone as much as they please to people on that exchange for the moderate fixed charge of £3 a year.



In the United States there are to-day more telephones in use by farmers than the whole number in use by the commercial and all other classes in the United Kingdom, and these telephones are found to add to the profits and comfort of the farmers to an extent which makes the cost of the telephones seem negligible.

The Postmaster-General is ready to provide lines of the same kind in the rural districts of the United Kingdom. By means of such a line a farmer can speak from his farm to all the people who are telephone subscribers with whom he does business, not only in the nearest town but also as a rule in all places within a distance of about 100 miles. He can also send messages and receive replies by telephone when his correspondents are not telephone subscribers, or he can get them to speak to him from a public call office. If a machine is broken he can order a new part without the trouble of a journey into the town or the delay of sending an order by post. He can get the latest information as to market prices, and arrange to the best advantage for the sale of his produce and stock, and he can get any weather reports and forecasts which he may want to guide him when crops have to be gathered. In the case of illness a doctor can be summoned, or a veterinary surgeon for his horses and cattle. If a fire occurs assistance can be called. He can speak to any neighbouring railway station and arrange for the despatch or delivery of his goods and produce. He can despatch a telegram without the trouble of sending a messenger to the telegraph office, and he can receive his telegrams by telephone without waiting for a messenger to bring them out, and he can also call a messenger to take an express letter. In a short time the telephone becomes the most valued implement of the farm.

Co-operative movements among farmers for the use of central dairies and creameries, or for the collection and distribution of produce, can only be worked to the best advantage if a telephone service is available to bring the farms of members into direct communication with the central establishments.

If a farmer has a telephone he can in a few minutes, when he is at home for breakfast, dinner, or supper, do business

which otherwise would involve inconvenient and expensive journeys to neighbouring towns, or which he could not do at all owing to the delay involved in reaching the other parties concerned. When his work is over he and his family can talk to their friends and neighbours, and can even arrange social meetings which would otherwise be impossible. In many other ways, too numerous to mention, the telephone helps him to overcome the chief drawbacks of country life, and enables him to do business on as good a footing as if he lived in a town.

If you would like to have a telephone service of this kind in your district, please write to the Secretary, General Post Office, London. Before you do so try to interest your neighbours in the scheme, and find out how many are willing to join at the rate of £3 per year for unlimited calls on their own exchange, and with the power of talking to other towns at the rate of 1d., 2d., 3d. per conversation, according to the distance for towns within 25 miles and at the rate of 6d. for towns within 50 miles.

To make the scheme practicable a minimum of five subscribers is required, with an average of three subscribers per mile of route from the telephone exchange. Full particulars will be sent to you by post, and, if there is any prospect of a successful scheme, a representative will come to discuss the matter with you personally.

## SUMMARY OF AGRICULTURAL EXPERIMENTS.

### SOILS AND MANURING.

**Calcium Cyanamide and Nitrate of Lime** (*Roy. Agric. Coll., Scientific Bulletin, No. 2, 1910*).—Four nitrogenous manures were compared on oats. The plots were each  $\frac{1}{10}$  acre, and each manure was used on two different plots. A dressing of mineral superphosphate, at the rate of 3 cwt. per acre, was given to all the plots except the unmanured, sulphate of ammonia was used at the rate of 1 cwt. per acre, and the other manures in quantities containing the same amount of nitrogen as 1 cwt. sulphate of ammonia, viz., nitrate of soda, 147 lb.; nitrate of lime, 176 lb., calcium cyanamide, 140 lb. The results per acre, taking the average of the two plots in each case, were:—

	Grain. Bushels of 40 lb.	Straw. Cwt.
Unmanured ... ..	43	16 $\frac{3}{4}$
Nitrate of soda ... ..	47 $\frac{1}{2}$	18
Sulphate of ammonia ... ..	48 $\frac{3}{4}$	20 $\frac{3}{4}$
Calcium cyanamide ... ..	53 $\frac{1}{2}$	17 $\frac{3}{4}$
Nitrate of lime ... ..	57 $\frac{1}{2}$	18

**Composition of Sawdust** (*Roy. Agric. Coll., Cirencester, Scientific Bulletin, No. 2, 1910*).—The use of sawdust as litter, and, consequently, as a constituent of manure, makes its composition, as regards nitrogen and ash constituents, of interest to agriculturists. The sawdust of the wood of various trees, obtained from sawpits, was examined at the College. The water in the sawdust, as received, varied from 6 to 13 per cent. In the dry matter the nitrogen varied from 0.14 per cent. to 0.30 per cent., and the mineral matter from 0.25 per cent. to 1.38 per cent. Assuming the presence of 10 per cent. of moisture, the mean result is 0.2 per cent. of nitrogen in the sawdust.

**Manuring of Potatoes** (*Univ. Coll. of N. Wales, Bangor, Agric. Dept., Bul. 8, 1910*).—This experiment has been carried out for the last three years, at six centres each year. Taking the average for the three years, the average crop of marketable potatoes from the unmanured plot has been 4 tons 2½ cwt. Ten tons of farmyard manure per acre have produced an increase of 2 tons 19 cwt., and 20 tons of farmyard manure have given an increase of 4 tons 2 cwt. There is little doubt that the extra ten tons could be used with more effect elsewhere. The highest yield (9 tons 10½ cwt. per acre) has been obtained from 10 tons of farmyard manure supplemented by a complete dressing of artificials, viz., 202 lb. sulphate of ammonia, 524 lb. superphosphate, and 164 lb. sulphate of potash per acre. These artificials cost £2 12s. per acre, and increased the yield by 2 tons 9 cwt. per acre, so that the extra quantity of marketable potatoes was obtained at a cost of a little more than £1 per ton. Professor Winter states that, looking at the experiment as a whole, it is clear that 20 tons of farmyard manure per acre cannot be economically applied, although 10 tons per acre is not enough to produce a full crop of potatoes. The returns on the plots where the smaller amount of farmyard manure, along with an incomplete dressing of artificials, was used were relatively satisfactory. The plots that received the complete dressing of artificials in addition to 10 tons farmyard manure gave the best result.

**Manuring of Permanent Grass Land** (*Roy. Agric. Coll., Cirencester, Scientific Bulletin, No. 2, 1910*).—This experiment has been carried out on the same land for over twenty years. A summary of the results from the beginning was given in the *Journal* for August, 1910, p. 399. The soil varies considerably in depth and texture, and in the amount of carbonate of lime contained in it.

In 1910 the unmanured plot gave over 25 cwt., a crop that has been exceeded in only two previous years. Two plots with 12 tons of farmyard manure annually gave an average increase over this of 18¼ cwt. The artificials were applied in the following quantities per acre:—Nitrate of soda, 2½ cwt.; sulphate of ammonia, 2 cwt.; superphosphate, 5 cwt.; kainit, 5 cwt.; and with these quantities a yield of over 2¼ tons, or about 20 cwt. more than from the unmanured plot was obtained from various combinations. Ten cwt. of basic slag alone improved the quality of the herbage, but had little effect on the quantity.

A preliminary botanical examination of the growth in the field has been made. On the unmanured plot, and on the plots receiving kainit alone and nitrate of soda alone, the number of flowering species found was about 30; with kainit and superphosphate the number was reduced to 22; and with kainit, superphosphate and nitrate of soda, to 16.



On this last plot there were no buttercups, and 13 of the species were grasses and leguminous plants. On the unmanured plot the ratio of the weight of grasses to leguminosæ was 9 to 1, and of the latter nine-tenths was *Lathyrus pratensis*.

With kainit alone and kainit and superphosphate the proportion of leguminosæ was about the same, but the most abundant plant was white clover. Where nitrate alone and the complete mineral manure were used, the proportion of leguminosæ was reduced. Of the grasses, Upright Brome (*Bromus erectus*) was the chief on all plots, the smallest proportion of it (about 70 per cent.) being on the plot receiving a complete mixture of artificials. Where it had decreased, its place among the grasses was mainly taken by cocksfoot and fescues.

### FIELD CROPS.

**Growth of Linseed** (*Univ. Coll. of N. Wales, Bangor, Agric. Dept., Bul. 7, 1910*).—Linseed is used on almost every farm for calf-rearing and other purposes, and, as it has been selling at a high price for some considerable time, a series of trials was arranged to see if it could be profitably grown by the farmers themselves. A quarter of an acre was sown on each of eleven farms in North Wales. The seed was sown about the end of April, at the rate of 104 lb. per acre, and was covered very lightly. Linseed does not ripen like corn, but produces flowers and ripe seeds at the same time, and it is harvested when most of the flowers have formed pods, and when the oldest pods are quite ripe and dry. On most of the farms the crop grew well, but after flowering went down a good deal on account of rainy weather. The crops varied considerably, from 48 lb. on the quarter acre at one centre, where it was beaten flat by the rain, and damaged after cutting by bad weather, to 407 lb. at another centre. In the majority of cases good crops were produced, and the average from the quarter acre was about 2 cwt. Professor Winter considers that if linseed remains at its present high market price, there can be little doubt that it would pay many farmers to grow what they require for their own use, and possibly, in some cases, it might be grown successfully on a commercial scale.

**Varieties of Oats** (*Roy. Agric. Coll., Cirencester, Scientific Bulletin, No. 2, 1910*).—A trial of five varieties of oats was made on the College farm in 1910, on plots between a quarter and a third of an acre in size. The yields per acre were:—

	Grain. Bushels of 40 lb.	Straw. Cwt.
Banner ... ..	82	45
Abundance ... ..	77	39
Thousand Dollar ... ..	71	36
Newmarket ... ..	66	44
Black Tartar ... ..	58	41

Black Tartar weighed only 31 lb. per bushel. An analysis of the grain of each variety is given in the report.

**A Russian Method of Corn Cultivation.**—Reports of experiments carried out at Bromberg, in Germany, to test the efficacy of the method of corn cultivation advocated by M. Demtschinsky have appeared in this *Journal* for December, 1909, and February, 1911. The account of the following experiments conducted at Weihestephan, in 1909 and

1910, taken from the *Praktische Blätter für Pflanzenbau*, &c. (April, 1911), may be given for purposes of comparison.

The earthing-up method only came under consideration, the trials being made on winter barley. Three plots of the same size, each in duplicate, were selected on a heavy loam, and were manured in the autumn of 1909, before seeding, with basic slag and potash. A top-dressing of nitrate of soda was given on May 3rd, 1910. Sowing took place on Sept. 3rd, 1909. Plot 1 was sown in the ordinary way, at the rate of 120 lb. of seed per acre, the seeding being done as evenly as possible, in drills 8 inches apart, at a depth of 2 inches, and the seeds were covered over with earth so that the plot presented a level surface. On plots 2 and 3 a seed was sown at every two inches, the drill being two inches deep. The plants appeared on 10th Sept., 1909, and earthing-up took place on plot 2 twelve days after sowing, and on plot 3 seventeen days after sowing. In April, 1910, the plants on all plots were hoed. In the spring the development of the ear of barley in the earthed-up plants was behind that of the plants on plot 1.

Harvesting was carried out on July 5th, 1910, and the following yields per acre were obtained:—

		Grain. Cwt. per acre.	Straw. Cwt. per acre.
Plot 1	... ..	41	55
„ 2	... ..	39	48
„ 3	... ..	50	66

The best results were, therefore, given by earthing-up at the later date, while the yield from earthing-up at the earlier date was not so good as that from the ordinary method of cultivation. An examination of the number of ear-bearing stems per plant also showed the superiority of plot 3. The saving of seed effected by the Demtschinsky method was at the rate of 80 lb. per acre. The general result confirms that of previous experiments to the effect that the extra yield which may sometimes be obtainable by this method is insufficient to compensate for the extra labour.

**Seeds Mixtures for Permanent Pasture** (*Univ. Coll. of N. Wales, Bangor, Agric. Dept., Buls. 2 and 4, 1910*).—Experiments with four different mixtures for laying down permanent pasture were started in 1906, at nine farms. The plots were mown in 1907 and 1908, and a very satisfactory hay crop was given by a mixture containing a considerable quantity of rye grass and more red clover than the others. This mixture approached more nearly to the mixtures usually sown by farmers than the other three, and cost £1 os. 11d. for 31½ lb. per acre. The heaviest hay crop was given by a mixture recommended by Mr. R. H. Elliot, of Clifton Park, Kelso, which contained no perennial rye grass, but a larger number than usual of other pasture plants, including burnet, hickory, and kidney vetch, which are deep-rooting plants that may be useful in dry seasons and on light soils. This, however, weighed 47½ lb. per acre, and cost £2 9s. 9d. The plots were grazed in 1909 and 1910, and inspected in June, 1910. Two of the mixtures were found to have given a good close bottom and a fairly large amount of herbage, particularly suitable for grazing with sheep. These were Mr. Elliot's mixture and another having the following composition: Italian rye-grass, 4 lb.; perennial rye-grass, 6 lb.; cocksfoot, 4 lb.; meadow fescue.

3 lb.; meadow foxtail, 2 lb.; timothy, 2 lb.; crested dogstail,  $\frac{1}{4}$  lb.; hard fescue, 1 lb.; tall oat grass,  $\frac{1}{2}$  lb.; rough-stalked meadow grass,  $\frac{1}{4}$  lb.; smooth-stalked meadow grass,  $\frac{1}{2}$  lb.; yarrow,  $\frac{1}{4}$  lb.; broad red clover, 2 lb.; alsike, 1 lb.; white clover, 2 lb. The weight of the latter mixture sown was  $28\frac{3}{4}$  lb. per acre, at a cost of £1 2s. 4d.

A second series of plots was started in 1909, at five farms. Three of the mixtures were the same as those used in the former experiments, but instead of the fourth, a modification of Mr. Elliot's mixture is being tried, the cost being reduced, chiefly by omitting burnet, sheep's parsley, and kidney vetch, and introducing perennial rye-grass. The cost of this mixture, at the rate of  $37\frac{3}{4}$  lb. per acre, was £1 16s. 11d. The grass was cut for hay in 1910, when Mr. Elliot's original mixture gave the best crop, and the modification of it the next best.

### LIVE STOCK, AND FEEDING STUFFS.

**Feeding Animals with Dried Potatoes** (*Mitteilungen des K.W. Inst. für Landw., Bromberg*).—These experiments were carried out at two centres in Germany in 1904, 1906, and 1907. One trial was conducted on 18 steers, averaging about 7 cwt. each in weight, of which 9 were fed for 127 days on fresh potatoes, and 9 on dried potatoes, the other foods fed being the same for both lots of animals. The analysis of the dried potatoes gave the following result:—Water, 11·22 per cent.; crude fat, 0·48 per cent.; crude protein, 6·55 per cent.; nitrogen-free extract, 74·35 per cent.; crude fibre, 3·37 per cent.; and ash, 4·03 per cent. The content of pure albuminoids was 4·47 per cent., of which 3·80 per cent. was digestible. The amounts of potatoes fed per 1,000 lb. live weight per day were 50 lb. fresh potatoes and 16 lb. dried potatoes, these amounts having the same food value. The increases in live weight during the experimental period were 2·427 lb. in the case of dried potatoes, and 2·206 lb. in the case of fresh potatoes per head per day. Similar experiments were conducted in 1904 on pigs, steamed potatoes being compared with dried potatoes in the ration. The results were very slightly in favour of steamed potatoes.

In 1907 and 1908 trials with swine were undertaken to compare the feeding value of two kinds of dried potatoes with that of maize. The pigs were divided into three lots, the rations of each lot containing one of the foods under trial. The greatest increases in weight were caused by dried potato flakes (*Kartoffelflocken*), and next in order, maize, with dried potato slices (*Kartoffelschnitzel*) last. The explanation of the difference between the two potato foods lies in the fact that the starch in the dried potato slices is not digested so well as in the dried potato flakes. The meat and fat of the animals fed with the potato foods were quite as good as those of the lot fed with the maize.

To ascertain the limits to which feeding with dried potatoes can be carried six lots of six pigs each were chosen, two lots being fed with 10 lb. of dried potato flakes and dried potato slices, respectively, per 1,000 lb. live weight per day, two lots with  $17\frac{1}{2}$  lb., and the remaining two lots with 23 lb. Dried potato flakes again proved superior to dried potato slices, but no very decided advantage was obtained from the larger quantities. The largest quantity of dried potato flakes (23 lb. per 1000 lb. live weight per day) was eaten quite readily by



the animals up to the end of the experiment. On the other hand the two larger quantities of dried potato slices (17½ lb. and 23 lb. per 1,000 lb. live weight per day) were refused before the end of the experiment, and the smaller quantity had to be reverted to.

The general conclusion reached by Dr. Gerlach as the result of these trials is that these dried potato foods (which are largely used in Germany) form an excellent feeding-stuff for all kinds of stock, and may with advantage be used in preference to raw potatoes when the latter have sprouted or are otherwise of inferior quality. The practice of potato-drying derives its value from the circumstance that it enables a farmer to preserve his surplus stock of potatoes for an indefinite period.

**The Effect of Albuminoids on the Fattening of Full-grown Animals** (*Die Landw. Versuchs-Stationen, Band lxxiv. Heft. vi.*).—Certain experiments carried out by Professors Pfeiffer and Friske, in 1908, had given results which, contrary to previous observations, showed that a substantial production of albuminoids may take place in the feeding of adult animals, even though the ration is not particularly rich in nitrogen. The experiment was repeated in the winter of 1909-10, on a number of wethers of from 3¼ to 3¾ years of age. Two animals were fattened on foods with a high content of albuminoids and two on foods with a low content of albuminoids. The foods used were hay and bruised barley and beans.

The amount of nitrogen in the food converted into flesh was estimated by deducting the amount of nitrogen in the liquid and solid manure and wool from the amount of nitrogen in the foods fed, these amounts in each case being obtained by careful analysis. With the results obtained by such a calculation were compared the actual results obtained by slaughter of the animals and analysis of the various parts of the carcasses. In the latter case, the amount of nitrogen present before fattening was estimated from the amount of nitrogen in the carcasses of three unfattened animals, which were killed for the purpose at the beginning of the experiment.

The results of the experiment may be summarised as follows:—A considerable production of nitrogen in the form of flesh takes place in fattening full-grown animals. The worse the condition of the animals (as regards nourishment) before fattening, the greater is this production of nitrogen.

A lowering of the albuminoid ratio of the ration exercises, in the long run, no influence on the meat production of adult animals. A wide albuminoid ratio is equal in this respect to a narrow one, though the former may possibly be superior. That is to say, in these experiments no practical difference was found as regards flesh production between the foods with a high and low proportion of albuminoids.

The production of nitrogen in the animals as a result of fattening was, as a general rule, found to be higher when estimated by calculation than when obtained by actual slaughter. Only in the case of foods with the smallest proportion of albuminoids was there a noticeable agreement in the figures obtained by the two methods.

**Soy Bean Cake for Fattening Cattle** (*Roy. Agric. Coll., Cirencester, Scientific Bulletin, No. 2, 1910*).—A trial of soy bean cake in comparison with decorticated cotton cake was made on two lots of bullocks, consisting of two animals each. All were fed with mangolds, hay, and

barley meal, but one lot received 4 lb. daily of soy bean cake, and the other 4 lb. of decorticated cotton cake. The increase made by each lot was the same, and it is concluded that the two foods are of equal value for fattening, while the cost of soy bean cake is lower than that of decorticated cotton cake.

### DAIRYING.

**The Cellular Elements present in Milk** (*Jour. Brit. Dairy Farmers' Assoc.*, Vol. 25, 1911).—This investigation has been continued with the milk of animals other than the cow. Samples of milk from the ass and the goat, and a few samples of human milk were examined. The ass is a type of animal in which milk production has not been developed by breeding and selection, so that lactation is in no way "artificial," while the animal is docile and stolid. The goat is more of the type of the cow, but the milk-producing power has not been developed to such a degree. The conditions observed in the milk were very much in accordance with these characteristics. The cell count was very low and uniform in the ass's milk, and rather less so in the goat's milk. The opinion of the investigators is that these results tend to confirm the conclusions already arrived at. A uniform type of life tends to a fairly uniform excretion of tissue cells from the udder, but in the cow the udder must be looked upon as an organ which has by breeding and selection been brought to an artificial condition of milk secretion, and this has been accompanied by a stimulation of the tissues to cell proliferation, and a consequent liability to increase of the cellular elements which is not necessarily significant of disease.

**Difference in the Amount of Fat in Morning and Evening Milk owing to Unequal Intervals of Milking** (*Proc. Univ. Durham Philosophical Soc.*, Vol. iv., Pt. I.).—It is well known that afternoon milk is richer in fat than morning milk, and that this difference is largely, if not wholly, due to the shorter time from the morning to the afternoon milking. In this paper Mr. S. H. Collins has collected together the results of a large number of investigations of the composition of milk in order to find the amount of difference in the proportion of fat that is caused by various intervals between the milkings. The results arrived at are as follows:—

#### *Interval between milkings.*

12 and 12 hours,  
e.g., 6 a.m. and 6 p.m.

13 and 11 hours,  
e.g., 6 a.m. and 5 p.m.

14 and 10 hours,  
e.g., 6 a.m. and 4 p.m. }

14½ and 9½ hours,  
e.g., 6 a.m. and 3.30 p.m. }

#### *Difference in milk.*

Morning milk richer in fat than evening milk by 0.18 per cent.

Evening milk richer than morning milk by 0.33 per cent.

Do. by 0.70 per cent.

Do. by 1.09 per cent.

On the average, if a herd be milked 12 minutes earlier in the morning and 12 minutes later in the evening, the milk will be richer in fat by 0.1 per cent. in the morning, and correspondingly poorer in the evening.

**Foodstuff Requirements of Dairy Cows** (*Arbeiten der Deut. Landw. Gesell.*, Heft 171).—Experiments carried out by the German Agricultural Society to ascertain the starch equivalent and albuminoid requirements of dairy cows are reported in this publication by Dr. Hansen.

The amounts of these substances were determined in foods fed to 160 dual purpose cows.

Foods were fed representing three different quantities of starch equivalent, viz., 12.6 lb., 14.3 to 14.4 lb., and 15.6 lb. per 1,000 lb. live weight per day. The small quantity of 12.6 lb. proved insufficient either for obtaining the greatest milk production possible or for causing any appreciable increase in live weight. A milk production of about 31 lb. to 35 lb. per cow per day, however, resulted from feeding at the rate of 14.3 to 14.4 lb. of starch equivalent to 1,000 lb. live weight, and at the same time the animals became ready for the butcher. Foods containing 15.6 lb. per 1,000 lb. live weight were accompanied by a milk yield of 44 lb. to 46 lb. per cow per day, but the cost of such foods make this quantity unprofitable.

Five different quantities of albuminoids were fed (the starch equivalent remaining constant):— 2.1 to 2.2 lb., 2.5 to 2.7 lb., 3.0 to 3.2 lb., 3.5 to 3.6 lb., and 4.2 lb. per 1,000 lb. live weight per day. With regard to milk production, at least 2.5 lb. of albuminoids were found to be necessary, but a greater milk production resulted from the use of 3 to 3.2 lb. albuminoids. Whether it is more profitable to use this quantity than the lower amount will depend upon the prices of the foods. No remarkable increase in the milk yield from the use of 3.5 to 4.2 lb. albuminoids was obtained, and Dr. Hansen does not recommend these large amounts. The *percentage* fat content of the milk remained the same, whatever quantity of albuminoids was fed. The different quantities of albuminoids, therefore, had the same effect on the *total* amount of fat as on the milk yield.

For combined fattening and large milk production, large quantities of albuminoids were shown to be unnecessary. The most profitable quantity is 2.5 lb. to 2.7 lb. per 1,000 lb. live weight per day; a small quantity, say, 2.1 lb. to 2.2 lb., is insufficient. Contrary to expectation, the greatest increase in live weight was made when the animals were giving their greatest milk yield; the increase in live weight became less as the end of the period of lactation approached.

**Effect of Palm Nut Cake on Milk Production** (*Mitteilungen der Deut. Landw. Gesell., April 15th, 1911*).—Experiments on the Continent with regard to the effect of palm nut cake on milk production have, in the past, given very contradictory results, and a thorough investigation has therefore recently been made by Professor Kellner with a view to obtaining definite conclusions on the subject.

A very extensive series of experiments was organised, trials being carried out at nine of the most important experiment stations in Germany; and as a rule a different breed of animal was tested at each station. At each trial 20 cows were used, all in the first six months of the period of lactation, and these were fed for 30 days on a mixture of earth nut meal and crushed maize, for 30 days on palm nut cake and meal, with the same content of digestible albuminoids and carbohydrates as the earth nut meal and maize, and then for 30 days again on earth nut meal and crushed maize. In addition, foods containing sufficient albuminoids and carbohydrates were fed during all three periods, the content of the foods in each of these substances being kept at the same level throughout.

The effects of the foods varied at different stations and between



different animals. The milk yield from palm nut cake was greater at five stations and less at two than the yield from earth nut cake and maize. Although, on an average there was an increased yield from palm nut cake of 0.22 lb. per cow per day, it is concluded that no increase in the milk yield from the use of this feeding stuff can be reckoned on.

In every case, however, a considerable increase in the content of fat, whether reckoned in absolute figures or as a percentage of the quantity of milk, resulted from replacing earth nut cake and maize by palm nut cake. The effect was not noticeable, however, until some time after the change of feed, the maximum increase in fat content being reached in from 14 to 20 days. It was also found that the higher the milk yield of the cow, the more noticeable was the effect of the palm nut cake on the fat content, the increase in fat content in the case of cows of the "Wesermarsh" and East Frisian breeds (both heavy milkers) being 0.34 per cent., or 2.19 oz. to 2.26 oz. per cow per day.

The amount of palm nut cake and meal fed per cow per day was large ( $5\frac{1}{2}$  lb.), and it is doubtful whether smaller quantities would have had any appreciable effect on the fat content. The foodstuffs produced on the farm are generally rich in carbohydrates and poor in albumen, and this is also true of palm nut cake, so that it would only be profitable to feed this cake when it is necessary to buy foods containing a large percentage of carbohydrates, or when it is a question of feeding the animals with concentrated foods.

#### WEEDS, AND INSECT AND FUNGUS PESTS.

**The Weed Flora of Arable Land** (*Roy. Agric. Coll., Cirencester, Scientific Bulletin, No. 2, 1910*).—In 1910 the seasonal changes in the weeds of arable land on the College farm were examined, and this report deals principally with the observations made on one field. The surface soil of the field is a calcareous clay, with hardly any siliceous sand separable by washing. The subsoil is a mechanical mixture of stiff yellow clay, with limestone rubble resting on forest marble. It had been sown down to wheat in the autumn of 1909, and the weeds present were tabulated on March 30th, June 8th, July 7th, and October 30th, 1910. A frame a foot square was used, and the weeds enclosed by it counted at a number of places uniformly over the field.

On March 30th it was found possible to count not only the number of species, but also the number of individuals of each species. There were 17 species in all. Small seedlings of the ivy-leaved speedwell (*Veronica hederifolia*) were the most numerous, being 75 per cent. of the total number of plants. Chickweed (*Stellaria media*) was only moderately abundant (12 per cent.), and fumitory (*Fumaria officinalis*) reached 3 per cent. The rest were sparse. Other fields also showed a considerable dominance of the ivy-leaved speedwell, but fumitory was commoner, especially in fields with a thinner soil. As regards the total number of weed seedlings present, the average per acre varied in the different fields under wheat that were examined from thirty-two to fifty-two thousand.

On June 5th it was found impossible to count the individual plants, but a number of counts were made, as before, and the number of times that each species occurred per 100 counts was recorded, no notice being

taken of the number of plants of the species. The same three weeds were the most abundant as in March, but fumitory had greatly increased. The creeping thistle had also much increased, and the convolvulus, not noticeable in March, now took fifth place in abundance. The later germinating annuals, black bindweed and knotweed, especially the former, were very apparent; *Poa annua* had also much increased.

On July 8th the corn crop made it impossible to use the frame, and the foot square area had to be judged by the eye. The shading effect of the corn had then become very noticeable, the most abundant weeds being the climbers, which were numerically in advance of chickweed, speedwells, fumitory and others. Fool's parsley, apparently a late germinating annual, took a prominent place.

In October the flora was practically a repetition of that of the spring.

**A Disease of Broad Beans** (*Jour. Bath and West and Southern Counties Soc., Fifth Series, Vol. 5, 1910-11*).—The Society's Consulting Botanist, Mr. J. H. Priestley, is investigating the rust of broad beans, (*Uromyces fabae*) which has been prevalent in the West of England. This first attacks the leaves and haulms, upon which it appears as rusty spots, and the spores rapidly spread to the rest of the field. The fungus parasite is still under observation in the laboratory, but the following facts with regard to it are indicated as being the most important from the practical point of view:—

1. Infection from year to year takes place from the diseased spots on the old haulms stored in the rick, so that, if the disease is noted one year, all possible care should be taken to diminish the danger of infection from this source.

2. The disease is seldom dangerous unless it attacks the beans at a very early stage, and in parts of Worcestershire where the trouble used to be serious, it has been almost completely avoided by sowing winter beans. Where this disease has done damage during 1910, early sowing is strongly recommended for later years.

**Finger and Toe Disease** (*Jour. Land Agents' Soc., May, 1911, Vol. x.*).—Mr. Walter E. Collinge, in this article, describes some experiments with lime, followed by a dressing of sulphur, which he has found to be an improvement on the usual dressing of lime alone for finger and toe.

A field known to be very badly attacked was treated in the autumn of 1909 with a dressing of 15 cwt. of ground unslaked lime. It was put on with a manure distributor, and ploughed in. In the spring the same land was given a dressing of flowers of sulphur, 5 cwt. to the acre. An excellent crop of swedes was lifted the following autumn, and the roots were practically free from disease. On only one corner of the field was any disease noticeable, and this very small.

On this small patch there was a considerable amount of heavy clay, which was in a very wet and sticky condition, and quite apart from the fungus disease, badly required liming. A part of this, about one-sixth of an acre in extent, was again treated with ground unslaked lime at the rate of 12 cwt. to the acre in the autumn, followed in the spring with sulphur as previously. When the swedes were lifted in the autumn of 1910 no trace of the disease could be found, and the physical condition of the soil had wonderfully improved.

From these and smaller plot experiments, Mr. Collinge concludes :

(i.) That ground unslaked lime is better, where finger and toe disease is present, than ordinary slaked lime, and that this alone gives a reasonable amount of success.

(ii.) If sulphuring the land follows the liming, the results are considerably better.

(iii.) That if the two treatments are applied we have an antidote for this disease, which, at the same time, greatly benefits the soil.

## OFFICIAL NOTICES AND CIRCULARS.

A Report on the Agriculture and Soils of Kent, Surrey, and Sussex, by Messrs. A. D. Hall, M.A., F.R.S., and E. J. Russell, D.Sc., has been recently published by the Board. The survey of the agriculture and soils of the three south-eastern counties was begun by Mr. Hall in 1899, and was originally intended to relate only to the soils of Kent and Surrey. In 1907, however, on the removal of Dr. Russell from Wye to the Rothamsted Experimental Station, it was decided to add Sussex to the area under investigation, and to include a general account of the agriculture of this well-defined natural district. The earlier analyses of the samples of soils which were made at Wye Agricultural College, were repeated later at Rothamsted, in order to bring them into line with the later analyses made at Rothamsted. The account of the agriculture of the three counties is based partly upon the personal experience of the authors and partly upon information obtained from circulars of enquiry addressed to farmers in the district regarding rotations, varieties of crops, woodlands, &c.

Beginning with a review of the natural features of the district, the report includes an account of the crops, forestry, and live stock of the three counties, traces the relationship of the soils to the crops, and concludes with a description of the soils with tables of analyses. The report is well illustrated, and is accompanied by maps showing the geological formation, rainfall, and the distribution of various crops. It may be obtained at the office of the Board, 4, Whitehall Place, London, S.W., price 2s. 6d., post free, bound in green cloth.

The Board of Agriculture and Fisheries have received information that the weed known as Yellow Rattle, Rattles, Rattlegrass, Cock's-comb, and Horse-penny, is very abundant in some districts this season. They desire, therefore, to draw the attention of farmers whose hay crops may be infested by this annual weed to the necessity for early mowing, in order that the plant may be prevented from ripening and scattering its seeds.

The weed, specifically known as *Rhinanthus Crista-galli*, L., is most abundant in poor, worn-out grass fields, and early mowing, followed by manuring in autumn and spring, will do much to clear infested land.

An article on Yellow Rattle, illustrated with a coloured plate, appeared



in the *Journal of the Board of Agriculture* for May, 1908, copies of which may be obtained on application to the Board, price 4d., post free.

The Report (Part I.) of the Intelligence Division of the Board describes the work dealt with in the Commercial Control Branch during the year 1910. This Branch undertakes

**Report of the  
Commercial  
Control Branch.**

enquiries and correspondence as to the administration of the Sale of Food and Drugs Acts, 1875 to 1907; complaints relating to adulteration of articles of food affecting the interests of agriculture; the administration of the Fertilisers and Feeding Stuffs Act, 1906; prosecutions under the Merchandise Marks Acts, 1887 to 1894, and Section 1 (8) of the Board of Agriculture and Fisheries Act, 1903; and complaints as to rates and facilities for the carriage of agricultural produce by rail. The appendix contains a Report by the Principal Chemist of the Government Laboratories on the examination of samples of milk taken by an inspector of the Board of Agriculture and Fisheries in connection with an enquiry into methods of sampling milk conducted during June and July, 1910. A summary of this Report was given in the *Journal* for April, p. 30. Information as to the administration of the Fertilisers and Feeding Stuffs Act is also given, including particulars for each county in Great Britain of the arrangements made for sampling by the official samplers, and the fees for analysis payable by the purchaser.

Among the matters dealt with in the report (Cd. 5625, price 3d.) of the Departmental Committee appointed by the Board of Education

**Agricultural  
Exhibits at the  
Science Museum.**

on the Science and Geological Museums, is the development of the agricultural section of the Science Museum at South Kensington. The existing collection of agricultural implements and machinery, although containing some interesting examples, is recognised as being very fragmentary, and it is in regard to machinery that the Committee recommends the development of the collection. The appendix to the report states that the object of the collection should be to illustrate important inventions or interesting developments, and to provide exhibits useful to students and instructive for the general public, without making a comprehensive display of all the relations of agriculture, *e.g.* space might be found in the proposed new museum for a few important implements in use at the beginning of the seventeenth century and towards the end of the eighteenth century, and there might be as complete a set as possible of models of the chief implements and machines in use at the beginning of the twentieth century. Visitors would then be impressed with the great changes that have taken place in three centuries, even in the simple implements employed in husbandry. Machines quoted as examples are ploughs, harrows, grubbers, cultivators, rollers, drills, artificial manure distributors, steam cultivating machinery, harvesting machinery, threshing machines, dairy implements and machines, and milling machinery.

The Committee does not recommend the inclusion in the agricultural section of objects representing agricultural botany, entomology, and geology, as it is stated that these should be associated with the biological and geological teaching collections to which they are related. It is proposed that the methods adopted for grouping and arranging the objects should be such as to obviate the risk of their presenting no agricultural sequence. Horticulture and forestry would not be included in the collection, as these subjects form part of the museums of the Royal Botanic Gardens, Kew.

The President of the Board of Agriculture and Fisheries is appointing Committees in each county for the purpose of assisting the Board in all matters pertaining to the encouragement and improvement of the horse-breeding industry. The members of these Committees are nominated by the Chairmen and Conveners of the County Councils, and are gentlemen having an intimate acquaintance with the industry of horse-breeding, and with their assistance and co-operation the Board hope to ascertain in the fullest manner all necessary details as to the character and extent of the industry in the localities which they represent.

Lists of the Committees already appointed have been given in the *Journal* for April, May, and June. The two following Committees are additional to those previously given:—

#### **Peebles.**

W. L. Dickson, Drumelzier Haugh, Broughton.

H. B. Marshall, Rachan, Broughton.

Robert Watson, Edderston, Peebles.

*Secretary*, J. Ramsay Smith, Peebles.

#### **Kinross.**

Alex. P. Haig, Blairhill, Rumbling Bridge, Stirling.

H. P. R. Montgomery, Hattonburn, Milnathort, Kinross-shire.

J. J. Mowbray, Naemoor, Rumbling Bridge, Stirling.

James Simpson, Aberdona, Clackmannan, Clackmannanshire.

Wm. Tod, East Brackly, Kinross.

*Secretary*, John Albert Marshall, Kinross.

#### **Wigtown.**

Archibald Crawford, Boughton Mains, Sorbie.

J. L. Drew, Doonhill, Newton Stewart, N.B.

John McCaig, Belmont, Stranraer.

A. B. Matthews, Newton Stewart, N.B.

Capt. Aymer Maxwell, Monrieth, Whauphill, Wigtown.

F. J. Rankin, Aird Castle, Kennedy.

*Secretary*, P. J. Adair, North Strand Street, Stranraer.

Foot-and-mouth disease was reported, on July 3rd, to exist at Bland's Farm, Hounslow, Middlesex. The Chief Veterinary Officer and one of the senior veterinary inspectors of the Board at once visited the premises, and found that forty-two swine, out of a total of seventy-six on the farm, were affected with the disease.

**Outbreaks of  
Foot-and-mouth  
Disease.**

In addition to the swine there were nineteen cattle on the premises, one of which has been found to be also affected. The infected place has been placed under strict police supervision, and the whole of the animals remaining on the premises have been slaughtered. On July 4th the Board made an Order controlling the movement of cattle, sheep, goats, and swine into, out of, or within a Scheduled District.

A further case was confirmed on July 6th, on premises within a quarter of a mile of the farm on which the original outbreak was detected. One animal, a cow, was found to be affected. The Board ordered the immediate slaughter of this animal, and of the remaining animals—eight cows and one goat—on the same farm.

With a view to relieve, as far as possible, difficulties in connection with the movement of animals direct to slaughter-houses in London, the Board made an Order on July 6th, allowing such movement by railway or by water into London of animals brought from places outside the Scheduled District. The Order came into operation on July 10th.

In the course of the house-to-house veterinary inspection of animals in the Scheduled District, a further case of foot-and-mouth disease was discovered on July 7th, on the premises known as Church Farm, Harlington. One cow was found to be affected, and there were on the same holding nine other cows and seven calves, which had been in contact with the affected cow.

The Board have reason to believe that infection in this case was carried by mediate contagion from Bland's Farm, and they have accordingly directed the immediate slaughter, with compensation, of the above-mentioned animals on Church Farm.

On July 10th the Board made an Order further modifying the restrictions on the movement of animals in the Scheduled District so as to afford certain facilities for movement for slaughter and for feeding or other special purposes. This Order came into operation on July 12th.

The Board have been informed by the Department of Agriculture and Technical Instruction for Ireland, Dublin, that the Department have suspended, for the present, all importations from Great Britain of cattle, sheep, goats, and other ruminating animals, and swine.

## MISCELLANEOUS NOTES.

**Importation of Plants into Canada.**—Revised regulations, dated February 27th, 1911, and published in the *Canada Gazette* of March

**Importation  
Regulations.**

11th, 1911, have been issued under the Destructive Insect and Pest Act (Canada). The following is a summary of the regulations in so far as they relate to stock originating in this country.

Nursery stock, including all trees, shrubs, plants, vines, grafts,



scions, cuttings, and buds are to be imported only through certain ports at stated periods, viz. :—Through Halifax, Sherbrooke, and Montreal, from September 15th to May 15th; through Vancouver, from October 1st to May 1st; through Niagara Falls, from October 1st to May 15th; through Winnipeg and St. John, from March 15th to May 15th, and from October 7th to December 7th; through Windsor and St. Johns (Quebec), from March 15th to May 15th, and from September 26th to December 7th.

The port through which the stock is to enter must be clearly stated on the package. Importers must give notice to the Dominion Entomologist, Experimental Farm, Ottawa, within five days from the date of ordering the stock, and transportation companies or other persons bringing the stock into Canada must give similar notice immediately the consignment is received by them. This notice must include the name of the consignor and the consignee, the points of origin and destination, the name of the company carrying the nursery stock, as well as the nature, quantity, and origin of the same.

Nursery stock or other vegetable matter (coming from Europe) is exempt from fumigation, but is to be inspected either at the port of entry or at its destination. If it is found to be infected with any of the following diseases it will be destroyed, together with the cases, &c., compensation being allowed up to two-thirds of the value of the stock :—San José Scale (*Aspidiotus perniciosus*), Brown-Tail Moth (*Euproctis chrysorrhæa*), Woolly Aphis (*Schizoneura lanigera*), West Indian Peach Scale (*Aulacaspis pentagona*), Gypsy Moth (*Porthetria dispar*), Potato Canker (*Chrysophlyctis endobiotica*), parasitic diseases affecting potatoes externally or internally, Branch or Stem Canker (*Nectria ditissima*), Gooseberry Mildew (*Sphærotheca mors-uvæ*), White Pine Blister Rust (*Peridermium strobi*).

The above regulations do not apply to the following plants, which may be imported through any port at any period and without inspection :—

(a) Greenhouse-grown plants, including roses in foliage, which have been grown in pots up to three inches in diameter, but not larger. A certificate that the plants have been grown under glass must accompany the invoice, and is to be signed by the consignor.

(b) Herbaceous perennials (the stems of which die down in winter), such as perennial phlox, peonies, sunflowers, &c.

(c) Herbaceous bedding plants, such as geraniums, verbenas, pansies, &c.

(d) Bulbs and tubers, such as hyacinths, lilies, narcissi, and other true bulbs, and also the tubers of dahlias, irises, &c.

**Importation of Plants into Sweden.**—Regulations of September 22nd, 1905, prohibit the importation into Sweden of gooseberry bushes and fresh gooseberries. Regulations of September 14th, 1906, provide that living plants imported into Sweden shall be accompanied by an invoice and certificate duly signed by the public authority of the place of exportation, to the effect that the consignment does not contain gooseberry plants or fresh gooseberries. Failing this, the consignment must be submitted by the importer to the Customs authority for examination. The certificate above referred to must be legalised by the Swedish Consul or Vice-Consul if such is stationed at the port of embarkation; but

nothing in the regulations is to prevent the Customs authority from handing over the consignment to the persons concerned, even if such certificate or invoice is wanting, if, after the ordinary Customs examination, the authority is satisfied that the consignment does not contain gooseberry plants or fresh gooseberries.

**Importation of Animals and Animal Products into Hungary.**—Regulations regarding the importation into, and transit through, Hungary of animals and animal products were issued by the Hungarian Minister of Agriculture on April 22nd, 1910, and came into force on May 1st, 1910.

Dogs, cats, hares, cage-birds, bees, and fish are not subject to any restrictions from a sanitary point of view.

Live and dead poultry, solipedes (horses, asses, and mules), fresh undried skins and furs, raw undried parts of animals, and other raw animal products originating in Europe, are inspected on entry into the country, and must be accompanied by the certificate of a State veterinary surgeon in the country of origin to the effect that the stock is healthy, or, in the case of dead poultry, that the birds were healthy before being killed, or, in the case of animal products, that they are from healthy animals; and the certificate must state in the case of poultry that no infectious animal disease has existed in the district of origin for 40 days prior to dispatch, or, in the case of solipedes, that no infectious disease which may be communicated to draft animals has similarly existed, or, in the case of animal products, that they are from a district free from disease. The certificate accompanying fresh undried skins and furs and raw undried parts of animals, if not issued by a State veterinary surgeon, or by the Austro-Hungarian Consulate, must be verified by the Consulate. If, however, certain animal products are sent without such a certificate their importation can only be refused if there are serious sanitary reasons to justify this course. In the case of solipedes a separate certificate is required for each animal.

The certificates of origin and health should, in addition to the above, contain the following particulars:—The country, district, and village whence the goods originate, the number and species of the animals, the kind, quality, and the number and total weight of the raw animal products, the place of despatch and destination of the goods, and the names of sender and addressee. The certificate should, if not written in the official language of the country of destination, be furnished with verified translation. Those relating to consignments to be transported through Hungary, which enter the frontier of Hungary, should, if not written in Hungarian, be furnished with verified Hungarian translation.

Cloven-footed animals and fresh and prepared meat can only be imported into or transported through Hungary with the previous special permission of the Minister of Agriculture, to be issued in each case, and with the conditions stipulated in the permission.

All the above animals and animal products can only be imported at certain stations designated for that purpose at the frontier of the Austro-Hungarian Customs territory. Consignments which on inspection have been found unhealthy or are suspected of some infectious disease, or which do not answer to the other conditions prescribed, are refused admission into the country. If poultry are found to be diseased the

birds are destroyed, and no compensation is paid to the owner. The transport of live poultry on railways can only be effected in railway carriages or in coops, closed with leaden seals, so constructed that the litter, food, and droppings cannot fall out.

**Agricultural Machinery in France.**—H.M. Consul at Bordeaux, in reporting on the trade of that district in 1910 (*F.O. Reports, Annual Series*, No. 4,659), states that the shortage

**Demand for  
Agricultural  
Machinery Abroad.** of crops in 1910 influenced the retail trade in agricultural implements in general, and left stocks on dealers' hands, with the result that fewer orders, particularly for harvesting machines, will be given in 1911. The American International Harvester Company, who have built works at Croix, near Lille, are turning out mowers and reapers of the same models and names as those previously imported. When in full working order they will be in a position to turn out annually some 20,000 mowers of their different types, on which they will save about 25 per cent. on the selling price in freight, duty, and other expenses. The British steam threshing machinery trade must also expect to suffer in future from competition at the hands of the Vierzon manufacturers, who are turning out good, light machines at very low prices.

**Agricultural Machinery in Turkey.**—According to the *Handelsmuseum* (Vienna) of May 18th, the Austrian Consul in Smyrna reports that there are exceptionally good openings for agricultural machinery in the interior of Asia Minor, particularly in the vilayet of Konia. A German agricultural machinery dépôt which was established a short time ago in Konia has been a great success. The farmers of Anatolia were particularly impressed by the fact that, although there was an excellent harvest in 1910, a large portion of the crops was wasted owing to scarcity of labour and of labour-saving implements. Further, irrigation schemes are being proceeded with, the object being to bring more land under cultivation, so that there is every prospect of a good trade in agricultural implements during the next few years. Manufacturers would be well advised, says the Austrian Consul, to combine for the purpose of sending an experienced traveller to the above-mentioned districts, in order to become fully acquainted with the conditions of the market. (*Board of Trade Journal*, May 25th, 1911.)

**Agricultural Machinery in Siam.**—A report on the exhibition which was held at Bangkok in April last (see *Journal*, January, 1911, p. 860) has been received from the Acting-Consul at that town (Mr. J. Crosby).

It appears that the feature of the agricultural machinery section was an extensive display of ploughs, so arranged as to contrast the native wooden article with light steel ploughs from Europe or America. Ploughing trials conducted on the experimental farm organised near the exhibition grounds demonstrated the great superiority of the latter type of implement over the native one. The steel ploughs are suitable for traction by one or two buffaloes, and they are said to weigh only a few pounds more than the wooden plough of the country, whilst their average price is no higher. H.M. Vice-Consul is of opinion that these ploughs should find a good market in Bangkok, and states that the Siamese Ministry of Agriculture is endeavouring to encourage their



use. Medals were awarded to German firms for these ploughs, as well as for threshing-machines and agricultural locomobiles.

**Opening for Agricultural Machinery in Western Canada.**—H.M. Trade Commissioner for Canada (Mr. R. Grigg) reports that the agent in Vancouver of a farmers' association of Western Canada desires to get into touch with British manufacturers of the following agricultural machinery and implements, viz.:—Self-binders, ploughs, farming traction engines, harrows, binder twine, butter-making machinery, wire fencing, windmills, farm waggons, hoes, drills, horse rakes, mowers and reapers, drag rakes, packers.

The name of the association may be obtained by British agricultural machinery makers on application to the Commercial Intelligence Branch of the Board of Trade, 73 Basinghall Street, London, E.C. For further information, inquiry may be made of the Imperial Trade Correspondent, Mr. P. G. Shallcross, c/o Messrs. Shallcross, Macaulay and Co., 144 Water Street, Vancouver. (*Board of Trade Journal*, June 8th, 1911.)

**Exhibition at Rostov-on-Don.**—H.M. Vice-Consul at Rostov-on-Don reports that the agricultural exhibition at that town will this year be

held from September 23rd to October 14th.

**Agricultural Exhibitions Abroad.** A horse show will be held from September 25th to October 3rd, and a cattle and poultry show from October 4th to October 14th. About £1,200 will be distributed as money prizes during the exhibition.

The weather conditions deteriorated throughout June, the month commencing in general with very unusual warmth, very abundant sunshine, and light rainfall, and ending with deficient warmth, scanty sunshine, and variable rainfall.

### Notes on the Weather in June.

During the *first* week (May 28th to June 3rd) the general condition was very fine and bright, but after the early days of the week thunderstorms occurred in all parts of Great Britain. Warmth was everywhere "very unusual," the mean values for the week being in most cases higher than any recorded in the corresponding week during the past thirty years. Rainfall was "light" or "very light," except in England E., where it was "moderate." Sunshine was everywhere "very abundant."

The general conditions continued dry and fine into the *second* week. Warmth was again "unusual" or "very unusual," and rainfall was either "light" or "very light." Bright sunshine was above the normal in all districts, the excess being large, except in Scotland N.

The *third* week witnessed a change in the weather, and by the end of the week unsettled conditions extended over the entire country. Temperature was "deficient" in all districts, and "very deficient" in Scotland E. Rainfall was deficient over the east of Great Britain, slightly in excess of the average in England N.E., and rather more than the normal amount in the western and south-western districts. Bright sunshine was either "moderate" or "abundant."

The weather was very changeable throughout the *fourth* week, but in the earlier half of the week most districts were favoured with

fairly long intervals of bright sunshine. Warmth was generally classed as "moderate," but was "unusual" in England E. and N.E. Rainfall was "heavy" or "very heavy," amounts ranging between 1 in. and 1½ in. being recorded on the 23rd at most places in the eastern half of England, still larger quantities falling on the 24th in the north of England and east of Scotland. Bright sunshine was usually "scanty."

Unsettled conditions continued into the *fifth* week. Temperature was below the normal, being classed everywhere as "deficient" or "very deficient." Rainfall was variable, the falls being "heavy" in Scotland N. and England E., and "moderate" elsewhere. Sunshine was "scanty" or "very scanty."

The International Institute of Agriculture, in its Bulletin of Agricultural Statistics for June, 1911, gives the following particulars with regard to the condition of winter-sown cereals on June 1st, 1911, compared with the condition on the corresponding date in 1910:—

### Notes on Crop Prospects Abroad.

Country.	Winter Wheat.		Winter Rye.		Winter Barley.		Winter Oats.	
	June 1st, 1911.	June 1st, 1910.	June 1st, 1911.	June 1st, 1910.	June 1st, 1911.	June 1st, 1910.	June 1st, 1911.	June 1st, 1910.
Belgium . .	105	—	108	—	105	—	—	—
Denmark . .	103	101	105	98	—	—	—	—
Luxemburg .	102	98	105	87	102	106	102	—
Norway . .	—	—	95	—	—	—	—	—
Roumania . .	115	145	115	145	115	155	—	—
Switzerland .	100·3	103	98·3	101	104·6	102	—	—
United States.	98·5	97·7	98·2	100·8	—	—	—	—
Japan . . .	105	—	—	—	110	—	—	—
Tunis . . .	120	105	—	—	110	100	115	120
Lower Egypt .	127	—	—	—	—	—	—	—
Upper Egypt .	117	—	—	—	—	—	—	—

(100=average yield.)

The condition of spring cereals on June 1st, 1911, compared with the condition on the corresponding date in 1910 is given as follows:—

Country.	Spring Wheat.		Spring Rye.		Spring Barley.		Spring Oats.	
	June 1st, 1911.	June 1st, 1910.	June 1st, 1911.	June 1st, 1910.	June 1st, 1911.	June 1st, 1910.	June 1st, 1911.	June 1st, 1910.
Belgium . .	105	—	—	—	105	—	105	—
Denmark . .	—	—	—	—	99	102	102	102
Luxemburg .	105	99	210	96	110	100	101	97
Roumania . .	—	—	—	—	115	150	115	120
Switzerland .	101·75	100	—	100	100·4	102·5	99·3	102
United States.	101·1	99·8	—	—	99·2	99	96·9	102·9
Japan . . .	84	—	—	—	123	—	99	—
Lower Egypt .	—	—	—	—	120	—	—	—
Upper Egypt .	—	—	—	—	112	—	—	—

(100=average yield.)

The condition of the crops in Belgium, Denmark, Spain, Ireland, Luxemburg, Norway, and Roumania appears from the reports given to be generally good.

*Russia*.—The rain which fell at the end of April and the beginning of May (o. s.) in certain parts of the country made a great improvement in the condition of the winter cereals in comparison with their condition in the beginning of spring. The hot weather then set in, and on May 10th (o. s.) the condition of the winter cereals could be considered as satisfactory on the whole, although it was not possible to ascertain exactly the extent of the damage caused by the cold and drought in the winter and in the beginning of spring. It may be said, however, that the regions which have been most seriously tried are the north-west, the extreme south-west, and the northern Caucasus; in the two latter places, the wheat is not in as good a condition as the rye.

The area sown to cereals has not decreased except in the regions mentioned above, the damaged crops of winter cereals having been replaced by spring cereals. The spring sowings have been made much later than usual everywhere, on account of the cold weather in April. In the south it was not possible even to begin them before the beginning of April (o. s.). The germination was very uniform, but the growth was arrested later on by the return of the cold and drought.

*Switzerland*.—The probable yield of cereals is estimated as follows:—Wheat, 1,877,000 cwt.; rye, 905,000 cwt.; barley, 199,000 cwt.; and oats, 1,433,000 cwt. The weather conditions are favourable to the crops. There are no diseases, with the exception of a little rust.

*Canada*.—The table given below indicates the condition of the wheat, rye, barley, and oat crops on June 1st, 1911, expressed in the percentage of a "standard" condition of the cereals on June 1st of the past year:—

				June 1st, 1911.		June 1st, 1910.
Winter	wheat	...	...	80'63	...	87'65
Spring	wheat	...	...	96'69	...	91'49
	Rye	...	...	90'26	...	88'12
	Barley	...	...	93'49	...	92'94
	Oats	...	...	94'76	...	93'95

The season is favourable to the crops in all parts of the country, and they are growing well.

*Japan*.—The probable yield of cereals is estimated as follows:—Wheat, 11,569,000 cwt.; barley, 40,499,000 cwt.; and oats, 1,307,000 cwt.

*Tunis*.—The condition of the wheat, oats, and maize crops is excellent. The rains were abundant and well distributed during the spring. The wheat crop is estimated at 4,133,000 cwt., as compared with 2,165,000 cwt. in 1910.

*Chile*.—The preparatory work and the sowing of autumn cereals are being carried out under average conditions. The weather conditions are favourable, although the sowing is being done at rather a late date.

*Australia*.—The preparatory work and the sowing of autumn cereals are being carried out under average conditions. The weather conditions are favourable, and the period is normal.

*New Zealand*.—The preparatory work and the sowing of autumn



cereals for wheat, barley, and oats are being effected under average conditions. The period is quite normal and the weather conditions are favourable.

*India.*—The final general memorandum on the wheat crop of the season 1910-11 gives the total area under the crop as 29,554,500 acres, or 5·5 per cent. above the revised figure for 1909-10, and 9 per cent. above the average of the preceding five years. The total outturn in 1910-11 is estimated at 9,900,800 tons, as against 9,590,600 tons in 1909-10, and an average of 7,868,200 tons during the preceding five years. The wheat crop of 1910-11 is thus the largest on record. (*Indian Trade Journal*, June 1st, 1911.)

*United States.*—H.M. Consul at Chicago states that according to the United States Government report the total yield of spring wheat on June 1st was estimated at 284,000,000 bushels, as compared with a final yield of 231,000,000 bushels in 1910. The estimated winter wheat crop was 480,000,000 bushels, as compared with a final yield in 1910 of 464,000,000 bushels. The total wheat crop estimate on June 1st was thus 764,000,000 bushels, as against 695,000,000 bushels in 1910, being the largest yet recorded.

According to *Dornbusch* of July 10th, 1911, the United States Department of Agriculture estimates the condition of winter wheat on July 1st at 76·8, compared with 81·5 on July 1st, 1910, and a ten-year average of 81·4. The condition of spring wheat is estimated at 73·8 on July 1st, compared with 61·6 on July 1st, 1910, and a ten-year average of 87·8. Oats and barley are put at 68·8 and 72·1 respectively, as against 82·2 and 73·7 last year, and a ten-year average of 86·3 and 87·9.

*Hungary.*—On June 27th the Ministry of Agriculture estimated the area under wheat and rye to be below, and that of barley and oats to be slightly above, the area harvested in 1910. The wheat and rye crops were estimated at 87,223,000 cwt. and 24,836,000 cwt., compared with 90,886,000 cwt. and 26,161,000 cwt. in 1910. The development of barley and oats is very favourable, and potatoes promise well, the earlier sorts being already harvested.

*Austria.*—The Ministry of Agriculture gives the condition of crops in the middle of June as follows:—Wheat, 2·5; rye, 2·7; barley, 2·4; oats, 2·5; maize, 2·6; and potatoes, 2·3 (2=above average, 3=average). Wheat and rye were not in so good a condition as on the same date in 1910, while barley and oats were better than last year. Wheat, although developing well, has in general suffered badly from rust. Potatoes in general were healthy, and where planted early were already in blossom.

*Sugar-Beet in Russia.*—A dispatch from H.M. Ambassador at St. Petersburg, dated June 1st, reports that the area under sugar-beet is estimated on the authority of sugar factories interested at 1,943,000 acres, which represents an increase of 271,000 acres, or 16·4 per cent. over last year's area. In view, however, of the lateness of spring this year, field operations have been much retarded, and on May 3rd only 1,148,000 acres, or 59 per cent. of the total estimated area had been sown, as against 76 per cent. on the same date last year. It is feared,

therefore, that the area actually sown this year will prove eventually to be considerably smaller than that estimated by the sugar factories.

**Norway.**—H.M. Consul at Christiania (Mr. E. Gray), in a dispatch dated June 19th, states that according to the report of the *Morgenbladet* it is already certain that the hay crop of Norway, which is by far the most important crop on farms in that country, will be a poor one, as the grass has been so much forced by the unusual early heat that it has ceased growing under the prolonged drought. Corn and meadow lands are greatly retarded by the continuation of the severe drought and by the recent change from extremely hot to very cold weather; the corn crops may, however, yet be saved by a timely rainfall.

**France.**—The report of the Ministry of Agriculture gives the condition of potatoes on June 1st as good to very good in forty-seven departments, above average to good in thirty-two departments, and average in one department. On the whole the condition of the crop is much better than at the same time last year, when a good to very good condition was reported from twenty-five departments, an above average to good condition from fifty departments, and an average condition from four departments. (*Journal Officiel*, June 25th, 1911.)

With regard to wheat, the general aspect on June 8th was satisfactory; the area under this crop is about 96 per cent. of the area of 1910. (*Bulletin of Agricultural Statistics, Supplement*, June 30th, 1911.)

**Holland.**—The British Consul at Rotterdam, in a report on the prospects of fruit and vegetable crops in Holland as on June 1st, states that the continued drought will, it is feared, adversely affect all kinds of garden produce, particularly strawberries. Gooseberries have been damaged by the frost, but apples and cherries are expected to be a good crop. Pears will be scarce, owing to the drought and damage from insects, and only a moderate crop of raspberries and plums is expected. The prospects of vegetable crops generally are good.

The *Bulletin of Agricultural Statistics, Supplement*, June 30th, 1911, gives the condition of cereals on June 15th as follows:—Wheat, 111; rye, 114; barley, 109; oats, 94 (100=average).

**Canada.**—The condition of wheat and oats on June 1st was on the whole a little better than that of last year at the same period. The area cultivated is 113 per cent. in the case of wheat, and 104 per cent. in the case of oats of last year's area. The condition of barley and rye on June 1st was rather better than last year at that date. The area is slightly less than in 1910. (*Bulletin of Agricultural Statistics, Supplement*, June 30th, 1911.)

**Argentina.**—The preparatory work and the sowing of cereals is being effected under good conditions. The sowing period is normal and the weather conditions are favourable. (*Bulletin of Agricultural Statistics, Supplement*, June 30th, 1911.)

**Bosnian Plum Crop.**—H.M. Consul at Sarajevo reports that according to the *Bosniche Post* of June 26th, the prospects of the plum crop of Bosnia are not very good. The total crop is estimated at between 1,000 and 1,200 waggon loads of dried plums, appearances pointing to the fruit being large. Prices are expected to be proportionately high. On July 1st the prospects were somewhat improved.

The Crop Reporters of the Board, in reporting on agricultural conditions on July 1st, generally comment upon the adverse effect of the

**Crop Conditions  
on July 1st.**

continued spell of hot, dry weather upon the crops, and their improvement after the rain. Wheat stood the prolonged dry period better than barley or oats, and promises to be the best of the cereal crops. It improved during the month, and is now reported as for the most part strong and healthy, and coming into ear well. In some districts the straw is short, but it has made some growth with the recent rains. The yield on the whole is expected slightly to exceed the average, the best results being looked for in the northern division. Both barley and oats have suffered from the want of moisture, but have improved since the rains. The plant is thin and patchy in places, and generally short in the straw, and a yield below average is anticipated for both crops, oats being the least satisfactory of the three cereals. Beans have been considerably affected by "fly," and are short in the haulm. The yield is not expected quite to reach an average. Peas vary considerably, and reports state that the early varieties are yielding lightly, and for the main crop a yield slightly below average may be looked for.

Potatoes have generally done well, though some areas have been affected by frosts during the month. The plant is vigorous and healthy, and has been greatly improved by the recent rains; a slightly over-average yield is predicted. Early varieties are reported to have yielded light crops in some districts.

Roots suffered from the drought, and mangolds are thin in plant, and, although considerable improvement is recorded during the latter part of the month, they are generally backward. The yield is not expected to reach an average. Early sown turnips and swedes have suffered badly from the dry weather and "fly," and a large area has had to be re-sown. The later sown turnips were got in under more favourable conditions, and are a fair plant.

The spell of dry weather has changed the prospects for the hay crop, which at the date of the last report was expected to exceed average, while the results now are anticipated to be considerably below average. Considerable progress has been made with the cutting of "seeds" hay, much of which has been secured in good condition. Rain, however, interrupted the work, and little meadow hay has yet been mown. The yield of both kinds is expected to be under average, with better results from arable land than from meadows.

Cold nights during June checked the growth of hops, attacks of vermin have been very prevalent in the south-eastern division, and washing has been necessary; in most districts an average yield is anticipated. In the west midland division blight has been troublesome in Worcester, though in Hereford it is not now so severe. The crop is not promising in this division on the whole.

Fruit crops were extensively attacked by insects during the hot, dry weather, and from the same cause much tree fruit prematurely dropped. The crop of strawberries and raspberries is slightly over average, apples about average, and currants, gooseberries, plums, pears, and cherries under average.

The bareness of the pasture during the early part of the month affected the condition of the stock in some districts, but with the recent



rains the growth of grass was started, and cattle and sheep are now on the whole progressing favourably.

Summarising the reports and representing an average crop by 100, the appearance of the crops on July 1st indicates yields for Great Britain which may be represented by the following percentages:—Wheat, 101; barley, 97; oats, 94; beans, 99; peas, 99; potatoes, 102; mangold, 99; "seeds" hay, 94; meadow hay, 90; hops, 98.

The following statement shows that, according to the information in the possession of the Board on July 1st, 1911, certain diseases of animals existed in the countries specified:—

**Prevalence of Animal Diseases on the Continent.**

*Austria (week ending June 14th).*

Blackleg, Swine Erysipelas, Foot and Mouth Disease (3,482 Höfe).

*Belgium (fifteen days ending May 15th).*

Anthrax, Blackleg, Rabies.

*Bulgaria (nine days ending June 14th).*

Blackleg, Glanders and Farcy, Rabies, Sheep-pox, Sheep-scab, Swine-fever.

*Denmark (month of May).*

Anthrax, Foot-rot, Glanders and Farcy, Swine Erysipelas, Foot and Mouth Disease (one case).

*France (Month of May).*

Anthrax, Blackleg, Glanders and Farcy, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas, Swine-fever.

Foot and Mouth Disease (462 "étables" in 188 "communes").

*Germany (on June 15th).*

Glanders and Farcy, Swine-fever, Foot and Mouth Disease (16,504 infected places in 3,271 parishes).

*Holland (month of May).*

Anthrax, Foot-rot, Swine Erysipelas, Foot and Mouth Disease (4,602 outbreaks in 7 provinces).

*Hungary (on May 31st).*

Anthrax, Rabies, Sheep-pox, Swine Erysipelas, Swine-fever, Foot and Mouth Disease (2,732 "cours").

*Italy (week ending April 30th).*

Anthrax, Blackleg, Glanders and Farcy, Rabies, Sheep-scab, Swine Erysipelas, Swine-fever, Foot and Mouth Disease (576 cases entailing 25,004 animals).

*Montenegro (sixteen days ending April 15th).*

Foot and Mouth Disease (54 provinces infected entailing 484 animals).

*Norway (month of May).*

Anthrax, Blackleg, Swine-fever.

*Roumania (ten days ending June 13th).*

Anthrax, Dourine, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Swine Erysipelas.

*Russia (month of February).*

Anthrax, Cattle-plague, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Swine Erysipelas, Swine-fever, Foot and Mouth Disease (58,274 cases in 1,024 "communes").

*Servia (eight days ending June 10th).*

Anthrax, Rabies, Sheep-pox, Swine-fever, Foot and Mouth Disease (12 cases in 1 "commune").

*Spain (month of April).*

Anthrax, Blackleg, Dourine, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas, Tuberculosis.

*Sweden (Month of May).*

Anthrax, Blackleg.

*Switzerland (week ending June 25th).*

Anthrax, Blackleg, Swine Erysipelas, Foot and Mouth Disease (47 "étales" entailing 363 animals, of which 15 "étales" were declared during the week).

The Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based on returns from correspondents in various districts, on the demand for agricultural labour in June:—

### **Agricultural Labour in England during June.**

Employment was generally regular, except in the case of some men outside the regular farm staff, who lost a little time through the interruption of haymaking by rain during the last week of June. In many districts the demand for extra labourers was adversely affected by the dry weather which prevailed until the latter part of the month. There was, however, some scarcity of such men in several districts.

*Northern Counties.*—Employment was generally regular in these counties, but the demand for extra labourers was affected for the greater part of the month by the prolonged dry weather, which rendered the root crops backward, and reduced the amount of hoeing to be done. Correspondents reported a slight upward movement in wages at the Whitsuntide hiring fairs in Cumberland, Westmorland, and Lancashire, particularly in the case of women and girls, who were generally scarce.

*Midland Counties.*—Employment was somewhat affected by the dry weather, as in the Northern Counties, but improved towards the end of the month as haymaking became more general. There was not generally any marked surplus in the supply of extra labourers, though some excess over the demand was reported in several districts, including parts of the Bakewell (*Derbyshire*), Cannock, Stone, and Tamworth (*Staffordshire*), Woodstock (*Oxfordshire*), and Eaton Socon (*Bedfordshire*) Rural Districts.

*Eastern Counties.*—There was generally a good demand for extra labourers in these counties for hoeing and haymaking, and, apart from slight interruptions to haymaking caused by rain, there was but little irregularity of employment among men of this class. Some shortage of extra men was reported in several districts, including parts of the Chesterton, Melbourn and Wisbech (*Cambridgeshire*), Welton (*Lincolnshire*), Forehoe (*Norfolk*), and Plomesgate (*Suffolk*) Rural Districts.

*Southern and South-Western Counties.*—Extra labourers were in fairly good demand for hoeing and haymaking. Rain caused a little loss of time to haymakers towards the end of the month in some districts. Several correspondents reported that the demand for labourers was less than usual on account of light hay crops and the effect of the

dry weather on the root crops, but mention of a surplus in the supply of men was exceptional in the reports. On the other hand, some scarcity of men was reported in several districts, including parts of the Bridge (*Kent*), Godstone, Epsom and Farnham (*Surrey*), Andover (*Hampshire*), Chipping Sodbury and Dursley (*Gloucestershire*), and Bodmin and West Penwith (*Cornwall*) Rural Districts.

## THE CORN MARKETS IN JUNE.

C. KAINS-JACKSON.

There cannot be much doubt that an important check to trade has been found in buyers' belief that the present season would be not only a good, but an early one. In that event the current cereal year would not afford to holders of old corn their full period for unloading it before the new crops came on the market. Whether this expectation will be realised depends largely on the weather, but it may be remarked that stocks of none of the cereals are excessive, while of wheat they are decidedly below the average. But for the wholly exceptional May and first half of June the markets must admittedly have increased their prices in order to secure adequate supplies to tide over the remaining weeks of the cereal year.

*Wheat.*—Few price changes occurred during the month, and the sales of English were not large, even when allowance is made for the holiday intervals. The middle of the year is always an interesting point at which to compare values, and on June 30th, 1911, fine English wheat stood at 36s., against 33s. a year previously, and other sorts of wheat at the following prices, the mean value on June 30th, 1910, being given in brackets. Best Russian, 36s. (33s. 6d.); No. 1 Northern Manitoba, 37s. 6d. (35s.); No. 4 Manitoba, 34s. 9d. (32s. 6d.); new Australian, 36s. (33s. 6d.); Argentine, 35s. (32s. 6d.); and No. 2 white Calcutta, 35s. 6d. (33s.). When considering that the month closed with prices tending to go back a little, we must not forget the 2s. to 3s. advance achieved. It represents, so to speak, something definite in hand from which, with favourable crop prospects, a little may be "allowed off" and yet leave us fair prices and markets free from depression.

Shipments of the month were 808,000 qr. from North America; 1,403,000 qr. from South America; 2,646,000 qr. from Russia; 264,000 qr. from Europe S.E.; 672,000 qr. from India; and 375,000 qr. from Australasia. These figures show a general increase as compared with June, 1910, yet supplies on passage to the United Kingdom on June 30th, 1911, were only 290,000 qr. more than at a like date last year. The Continent must therefore have taken an unusually large quota of the total shipments. Continental purchasing has upheld our markets by its strong if indirect action, and may be expected to do so until the new crops of France, Italy, and Central Europe are actually in stock.

The American harvest of winter wheat was on the whole favourably spoken of, both for quantity and quality. There was, however, no anxiety to sell for early shipment, and 32s. 6d. cost, freight, and insurance to London, was about the price for September and October ex-



portation. In Canada, Winnipeg's price of 30s. 6d. for October delivery of new crop, against 32s. 9d. for July delivery of old, witnessed to the trade view of harvest prospects being decidedly favourable. The Indian new crop was officially reckoned on the June report as materially above an average, but shipments have not been taking place at any eager rate, and the Indian wheat harvest is being held with considerable confidence in its fetching a very fair price; 35s. for white, and 34s. for red are about the mean values indicated.

*Flour.*—A very poor inquiry from bakers has been recorded, and although the fine early summer has been against retail demand for bread, it is currently supposed that holdings at the bakeries are now much reduced, and will require replenishment soon. The prices ruling at the end of June thus compared with the new year a twelvemonth previously; 1910 prices are given in brackets. Top-price, 31s. (30s.); Town Whites, 28s. 9d. (27s. 6d.); Town Households, 25s. 9d. (24s. 6d.); Best Country Patents, 27s. 6d. (26s.); Country Straights, all English, 25s. (22s. 6d.); Minnesota Best, 30s. 6d. (31s. 6d.); Minnesota Patents, 26s. 6d. (28s.); Iron Duke, 23s. (23s.); Kansas Patents, 26s. (28s.); Australian, 26s. (26s.); and fine Hungarian, 42s. (39s. 6d.). "Standard," not a leading type a year ago, is now quoted 26s. to 27s. London, 25s. to 26s. country. American shipments for June were fair, 468,000 sacks, but no other exporting country did much, and on the 30th only 174,000 sacks were on passage from all sources.

*Barley.*—Russian feeding corn has maintained through June the advance won in May, but India and Persia have done something to relieve the scarcity of this type, and value therefore has not been further enhanced. Malting and brewing sorts have been very scarce, but inquiry also being at a low ebb, no price changes are to be noted. Russia shipped 1,981,000 qr., but of this total Continental purchasers took by far the greater quantity. No other country shipped any important quantities of barley. On the last day of the month there were 300,000 qr. on passage.

*Oats.*—British oats are again markedly dearer on the month, and the profit realised on holding oats until they are well seasoned is shown season after season. Imported oats are an instructive side-witness to the British position, for despite a 30 per cent. increase of June imports over those of May, the price has rather advanced than receded. Russia in June completely distanced Argentina as a shipper, the totals being respectively 1,061,000 qr. and 348,000 qr. There are now about half a million quarters of foreign oats on passage, but the exhaustion of the home crop is so nearly absolute that so far from this considerable total depressing the markets, the talk thereat is rather as to the earliest date at which the importer can assure delivery. The growing crop in Great Britain was regarded by the exchanges of the 20th and 21st as jeopardised by the drought, but then came the Coronation holidays, which ended in a liberal rainfall, and before trade had been resumed the drought anxiety had been somewhat allayed.

*Maize.*—Russia and South-Eastern Europe have in no previous year had so good a surplus available for early summer exportation. June shipments of 600,000 qr. from Russia and of 1,028,000 qr. from Europe S.E. have been the chief feature of the month, and have raised the supply on passage from 420,000 qr. to 710,000 qr. Argentina shipped

nothing, and America only 401,000 qr., so that the round corn of European growth has completely dominated the market. African maize of good quality has risen to 29s. per qr., but supply is still small. We must hope that in another season our African possessions will be in a position to satisfy the taste which they have created. That they can grow the very maize the British market requires has been proved, and it has sold well in June, even when priced 6s. above the 23s. level of Russian and American corn. The Burmese offers at five guineas per ton continue to be taken up, but there is as yet very little Asiatic corn actually on spot.

*Oilseeds.*—Demand is poor, a circumstance which, with summer setting in early, was only to be expected. Prices have fallen a little. Linseed perhaps may be averaged at 16s. 6d. per cwt., against 17s. 6d. a month ago, and cottonseed at 8s., against 8s. 4½d. per cwt. The prices asking for oilcake are comparatively moderate, and suggest the desirability of looking ahead to lay in "cake" in summer for the needs of the autumn and winter. At the end of June London-made linseed cake was making £7 17s. 6d. per ton, against £9 2s. 6d. a year ago; London-made cottonseed cake, £4 17s. 6d., against £7 a year ago; and East Indian rapeseed cake, £3 16s. 3d., against £4 18s. 9d. a year ago. Soy bean cakes at £5 15s. per ton may also be noted, and analysts of distinction affirm them to be of excellent feeding and fattening value.

*Various.*—Beet sugar has been a rising market, and those who sold in December and January at 9s. to 9s. 1d. per cwt. are seen to have lost heart unduly. Rice for feeding purposes has been steady at 8s. per cwt., and a reduction in the supply on passage suggests that the market may go rather higher than lower. A fair to good trade has been doing in Rangoon haricots to arrive in August; for these 7s. per cental may be quoted. Other "miscellaneous transactions" have included sales of Turkish canaryseed at £2 2s. per quarter, of locust beans at £6 per ton, of Sorghum or Argentine millet at 24s. per 416 lb., and of good New Zealand maple peas at 8s. per cental. The last-named find favour with keepers of poultry and rearers of game birds, but above all with the owners of pigeons.

## THE LIVE AND DEAD MEAT TRADE IN JUNE.

A. T. MATTHEWS.

*Fat Cattle.*—Under the adverse influences of hot weather, diminishing grass keeping and consequent increased supplies, the trade in fat cattle weakened very considerably, and prices fell during the first three weeks to the extent of over 3d. per stone. Refreshing rains, with lower temperatures and improved prospects for the pastures, caused a distinct revival in the last week, the tendency to hurry cattle to market being checked. Still the general averages for the month show a fall in values for all breeds compared with those of May. Shorthorns averaged 8s. 0½d., 7s. 4½d., and 6s. 4½d. per 14 lb. stone in about twenty English markets for first, second, and third qualities, against 8s. 4½d., 7s. 8½d., and 6s. 8d. in May. Herefords averaged 8s. 2½d. and 7s. 7½d., against 8s. 6½d. and 7s. 11d.; Devons, 8s. 2d. and 7s. 5½d., against 8s. 7d. and 7s. 9½d.; Polled Scots, 8s. 3½d. and 7s. 8½d., against

8s. 6d. and 7s. 11½d. per stone. All stock were similarly affected by the alarming continuance of the long spring drought, and there is no doubt that the above decline in cattle may be confidently attributed to that cause. London market formed a singular exception as regards supplies. The number of fat cattle offering at Islington averaged only about 500 weekly, which is little more than half the normal supply. On the last Monday there were only 350 on offer, and this was something like a record for that market. Yet the prices realised were well above the average throughout the month.

*Veal Calves.*—There was a further fall in the value of fat calves, and the average prices in about twenty-five British markets were 8½d. and 7½d. per lb., or ½d. per lb. less than those of May.

*Fat Sheep.*—The trade in sheep in June may be described as dull and discouraging. Until the last week the demand was sluggish, and average prices remained at a dead level for all qualities. These were :—Downs, 7d., 6½d., and 5d. per lb., and Longwools, 6½d., 5½d., and 4½d., for the three qualities as classified in the returns. In the last week, however, there was a welcome change of tone, and in a large majority of the markets quoted prices advanced ¼d. per lb. At Newcastle, Downs were quoted ¾d. per lb. higher than at the previous market, and at Basingstoke ½d., Dorchester being the only place showing a decline. A glance at the English markets for the last week shows a surprising difference in values at various markets. At Newcastle and Salford Downs were quoted at 8d. per lb., and at London, Bristol, and Derby 7¾d., but at Hereford, Shrewsbury, Wellington, and York the top price was only 6¾d. Prime Cheviots made 8½d. per lb. in English markets, or about ½d. more than in those of Scotland.

*Fat Lambs.*—As the season advances fat lambs are more freely marketed, individual weights increase, and therefore lower prices are expected. There has been a very fair demand for good lambs, and the average prices in about forty British markets were 10d. per lb. for first, and 9d. for second quality. This was a fall of 1½d. per lb. on first quality, and 1d. on second, compared with May.

*Fat Pigs.*—A further fall of about 6d. per stone took place in the average prices of pigs, which in twenty-eight markets were 6s. 5½d. and 5s. 9¼d. per stone for first and second quality.

*Carcass Beef—British.*—Supplies of Scotch beef were about normal, but towards the end of the month long or whole sides came very sparingly to hand, and were scarcely quotable in the Central Market. Their average price was 6d. to 6½d. per lb., or ½d. less than in May. Short sides were in better request, and averaged 6¾d. to 7d. per lb. English beef was only supplied in small quantities, and averaged 5½d. to 5¾d. per lb.

*Port-Killed Beef.*—There have been larger supplies of cattle from the States, and the quality was better than of late. Deptford-killed sides at Smithfield averaged 5¾d. to 5½d. per lb.

*Chilled Beef.*—As was the case with live cattle, chilled beef from North America showed an increased supply, and met with a very good demand. Its price steadily advanced all the month, and hindquarters averaged 5½d. to 6d. per lb., and forequarters 3d. to 3½d. Argentine chilled was a slow trade throughout, and a clearance often difficult, supplies generally exceeding the demand. Forequarters were especially



cheap, and realised considerably less than frozen. Average Smithfield prices for the month were  $3\frac{3}{4}d.$  to  $4d.$  per lb. for hindquarters, and  $2\frac{1}{4}d.$  to  $2\frac{1}{2}d.$  for forequarters.

*Frozen Beef.*—The trade was quiet but steady, and prices a fraction lower than in May. The averages were  $3\frac{1}{2}d.$  to  $3\frac{5}{8}d.$  for hinds, and  $2\frac{1}{2}d.$  to  $2\frac{3}{4}d.$  for fores.

*Carcass Mutton—Fresh-Killed.*—Very little change took place in the value of British mutton. Scotch was fairly supplied, and varied during the month to the extent of  $\frac{1}{2}d.$  per lb., but the averages were much the same as in May, viz.,  $7\frac{1}{2}d.$  and  $7d.$  per lb. for first and second quality. English tegs made  $6d.$  to  $6\frac{1}{2}d.$  per lb. Dutch mutton began to arrive, and made almost exactly the same price as the English on offer.

*Frozen Mutton.*—The advance which took place at the end of May was fully maintained, and trade was very firm all the month. The best New Zealand averaged fully  $4d.$  per lb., and Argentine and Australian about  $\frac{1}{2}d.$  less.

*Carcass Lamb.*—There have been large supplies at the Central Market, and many complaints were heard of the difficulty in clearing the market of British lamb. New Zealand Canterbury lamb has established a firm hold, and at a far lower price competes very strongly with home produce. The latter averaged about  $7\frac{1}{2}d.$ ,  $8\frac{1}{2}d.$ , and  $9d.$  for the three qualities, New Zealand best generally fetching about  $5d.$  to  $5\frac{1}{2}d.$  per lb.

*Veal.*—The demand for veal was disappointing, as many expected a good trade for the Coronation. Prices were considerably lower than in May, and the Smithfield average was only  $6\frac{1}{2}d.$  to  $7\frac{1}{2}d.$  per lb., Dutch realising about the same. There were many English calves on offer that were evidently slaughtered at a very few days old, and these sold at nominal prices.

*Pork.*—Supplies were naturally very small, but ample for the time of year, and  $6d.$  per lb. was the top price for English, Dutch making about  $5\frac{1}{2}d.$  and  $5d.$  per lb.

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## THE PROVISION TRADE IN JUNE.

HEDLEY STEVENS.

*Bacon.*—The improved demand reported in May continued during most of the month of June, and just prior to the Coronation festivities all descriptions of hams experienced a further smart advance, the continued fine weather increasing the demand for that description of cured meat.

Arrivals from most countries showed an increase over the same period of last year, but there was not any accumulation of stock until the end of the month, when heavier stocks were reported from Liverpool, Manchester, and Hull, brought about by the labour difficulties at those ports. The arrivals from Russia were smaller, as the low prices prevailing for this description during May caused heavy losses to the curers, and, in consequence, they reduced their killings. American meats fluctuated considerably during the month, the tendency being towards higher prices. Their home trade is reported to be good, and, the stocks

of cured meats on hand being small, packers are independent sellers. During June, prices for American hogs ranged from \$5.75 to \$6.50, against \$8.75 to \$9.75 at the same time last year, and \$7.00 to \$8.15 two years ago.

English pigs were in fair supply, but are not being marketed freely, as breeders look for improved prices in the near future.

*Cheese.*—The consumptive demand improved somewhat during the month, but the trade was not brisk. Stocks of really best last season's makes were much reduced, and with the later arrivals of the new makes showing more quality, and being procurable at proportionately lower prices, the demand for the latter description increased. In sympathy with the cables from Canada, prices at the end of the month were a little higher.

Although the weather conditions in Canada during June were good, the make was not so large as expected. The arrivals into Montreal from May 1st to June 27th were 8,500 boxes less than for the same period of last year, although they included 15,000 States cheese shipped via that port early in the season.

Prices advanced in the United States beyond those current in Canada, and in consequence the exports were practically nil.

At the end of the month the estimated stocks of Canadian cheese at the three principal distributing centres (London, Liverpool, and Bristol) were 118,000 cheese, against 178,000 at the same time last year, and 104,000 two years ago. The stock of New Zealand cheese was 11,800 crates in London and Bristol, against 23,000 last year.

Stocks of English cheese are small, and it is generally reported that the make is smaller this year, partly because of the dry weather experienced during the greater part of May and June, but more especially on account of the increasingly large demand for milk for domestic purposes.

*Butter.*—There was a moderate trade throughout the month, but at the reasonable prices current the demand continued chiefly for best selections. The arrivals from Siberia were of very fine quality, but the quantity is expected to show immediate reduction on account of the very dry weather reported from that country, and consequently a falling off in the flow of milk. A few small shipments of Canadian butter arrived in England during the month, this being much earlier than last season. They cost the importers around 107s. c.i.f. per cwt. Best New Zealand butter was very scarce, as the season is practically at an end, but all descriptions of Australian were plentiful at near the prices current at the same time last year. Prices for Irish butter advanced during the month, which somewhat checked the consumption of this description, but with tinning operations in full swing, the Irish dealers were able to maintain their prices.

*Eggs.*—Although the warm weather somewhat reduced the consumption of eggs generally, the London demand was very good, owing to the increased population during the Coronation week, and to the labour troubles at Hull docks, which forced a further demand for the London supplies.

## PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and SCOTLAND  
in the Month of June, 1911.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	ENGLAND.		SCOTLAND.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK:—	per stone.*	per stone.*	per cwt.†	per cwt.†
Cattle:—	s. d.	s. d.	s. d.	s. d.
Polled Scots ... ..	8 4	7 10	38 9	35 11
Herefords ... ..	8 3	7 8	—	—
Shorthorns ... ..	8 1	7 5	37 9	35 3
Devons ... ..	8 2	7 5	—	—
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	d.	d.	d.
Veal Calves ... ..	8 <sup>3</sup> / <sub>4</sub>	7 <sup>3</sup> / <sub>4</sub>	8 <sup>3</sup> / <sub>4</sub>	7 <sup>1</sup> / <sub>4</sub>
Sheep:—				
Downs ... ..	7 <sup>1</sup> / <sub>4</sub>	6 <sup>1</sup> / <sub>2</sub>	—	—
Longwools ... ..	6 <sup>3</sup> / <sub>4</sub>	6	—	—
Cheviots ... ..	8 <sup>1</sup> / <sub>2</sub>	7 <sup>3</sup> / <sub>4</sub>	7 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>
Blackfaced ... ..	8 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>4</sub>	7 <sup>1</sup> / <sub>4</sub>	6 <sup>1</sup> / <sub>2</sub>
Cross-breds ... ..	7 <sup>1</sup> / <sub>4</sub>	6 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	6 <sup>3</sup> / <sub>4</sub>
	per stone.*	per stone.*	per stone.*	per stone.*
	s. d.	s. d.	s. d.	s. d.
Pigs:—				
Bacon Pigs ... ..	6 5	5 11	6 6	5 7
Porkers ... ..	6 11	6 5	6 9	5 11
LEAN STOCK:—	per head.	per head.	per head.	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	21 10	17 17	21 18	17 19
„ —Calvers ... ..	20 17	18 2	19 5	16 17
Other Breeds—In Milk ...	19 1	16 5	19 4	15 15
„ —Calvers ... ..	16 10	14 0	18 17	15 15
Calves for Rearing ... ..	2 9	1 16	2 16	2 0
Store Cattle:—				
Shorthorns—Yearlings ...	10 9	9 2	11 6	9 6
„ —Two-year-olds ...	14 11	12 17	14 9	13 4
„ —Three-year-olds ...	18 0	15 14	16 10	14 7
Polled Scots—Two-year-olds	—	—	16 18	15 4
Herefords— ... ..	16 0	14 3	—	—
Devons— ... ..	15 1	13 1	—	—
Store Sheep:—				
Hoggs, Hoggets, Teds, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	37 11	33 1	—	—
Scotch Cross-breds ... ..	—	—	36 11	32 8
Store Pigs:—				
8 to 10 weeks old ... ..	19 9	15 9	25 0	19 9
12 to 16 weeks old ... ..	29 4	23 0	30 2	25 3

\* Estimated carcass weight

† Live weight.



AVERAGE PRICES of DEAD MEAT at certain MARKETS in  
ENGLAND and SCOTLAND in the Month of June, 1911.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	Birming- ham.	Liver- pool.	Lon- don.	Man- chester.	Edin- burgh.	Glas- gow.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF :—							
English ... ..	1st	53 6	53 6	54 0	54 6	53 6*	56 0*
	2nd	49 6	49 0	51 6	52 6	49 0*	53 6*
Cow and Bull ... ..	1st	46 6	44 0	46 6	47 6	45 0	46 0
	2nd	41 0	37 6	42 0	43 0	37 6	42 0
U.S.A. and Cana- dian :—							
Port Killed ... ..	1st	53 0	52 6	52 6	52 6	—	53 6
	2nd	50 0	47 6	50 6	50 6	—	51 6
Argentine Frozen—							
Hind Quarters...	1st	35 0	34 0	34 6	34 0	35 0	34 6
Fore „ ...	1st	25 0	24 6	24 0	24 6	25 0	24 6
Argentine Chilled—							
Hind Quarters...	1st	38 0	37 0	38 0	38 0	38 6	40 0
Fore „ ...	1st	26 0	26 0	22 6	26 0	25 6	26 6
Australian Frozen—							
Hind Quarters...	1st	34 0	32 6	34 6	32 6	—	33 6
Fore „ ...	1st	25 0	23 6	24 0	23 6	—	24 0
VEAL :—							
British ... ..	1st	65 6	72 0	70 0	71 6	—	70 0
	2nd	58 0	66 6	60 6	66 6	—	—
Foreign ... ..	1st	—	—	70 0	—	70 6	—
MUTTON :—							
Scotch ... ..	1st	—	73 6	67 6	75 0	64 0	68 6
	2nd	—	67 0	63 0	70 6	52 6	58 6
English ... ..	1st	62 0	68 6	59 6	70 0	—	—
	2nd	54 6	64 0	53 6	63 0	—	—
Argentine Frozen ...	1st	35 0	35 0	33 0	35 0	34 0	33 6
Australian „ ...	1st	34 6	32 6	33 0	33 0	36 0	31 0
New Zealand „ ...	1st	—	—	37 0	—	—	35 6
LAMB :—							
British ... ..	1st	—	83 0	86 0	83 6	86 6	94 6
	2nd	78 0	73 6	79 6	79 0	—	83 0
New Zealand ... ..	1st	50 6	49 0	48 0	49 6	51 0	49 6
Australian ... ..	1st	44 0	42 6	42 6	42 6	—	39 6
Argentine ... ..	1st	44 6	43 6	42 0	43 6	—	39 6
PORK :—							
British ... ..	1st	59 6	61 6	54 6	62 6	54 6	57 6
	2nd	54 0	56 0	49 6	58 0	47 0	55 0
Foreign ... ..	1st	—	—	52 6	—	—	—

\* Scotch.

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1909, 1910 and 1911.

Weeks ended ( <i>in</i> 1911).	WHEAT.						BARLEY.						OATS.					
	1909.		1910.		1911.		1909.		1910.		1911.		1909.		1910.		1911.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 7 ...	32	9	33	6	30	5	26	11	24	11	23	11	17	5	17	2	17	0
" 14 ...	32	8	33	8	30	8	27	1	24	11	23	10	17	5	17	7	17	2
" 21 ...	33	2	33	9	30	11	27	3	24	11	24	4	17	8	17	6	17	4
" 28 ...	33	0	33	6	30	11	27	6	25	0	24	5	17	9	17	4	17	3
Feb. 4 ...	33	4	33	7	30	9	27	7	24	10	24	5	17	10	17	7	17	5
" 11 ...	33	8	33	4	30	5	27	8	24	9	24	6	17	11	17	11	7	5
" 18 ...	34	1	33	0	30	3	27	11	24	6	24	7	18	0	18	0	17	6
" 25 ...	34	5	32	7	30	2	28	0	24	2	24	9	18	0	17	10	17	7
Mar. 4 ...	34	10	32	7	30	0	27	11	24	6	25	0	18	2	18	1	17	5
" 11 ...	35	8	32	6	30	1	28	4	24	1	25	0	18	2	18	0	17	5
" 18 ...	35	9	32	6	30	1	28	0	23	6	24	11	18	5	18	0	17	6
" 25 ...	36	0	32	9	30	2	28	0	23	7	25	0	18	6	17	11	17	5
Apl. 1 ...	36	5	33	0	30	3	27	10	23	8	24	11	18	8	18	0	17	5
" 8 ...	37	4	33	6	30	4	28	0	23	1	24	7	18	10	17	11	17	7
" 15 ...	38	7	33	7	30	3	27	8	23	5	25	2	19	2	18	3	18	3
" 22 ...	41	4	33	7	30	4	28	2	23	0	25	5	19	9	18	3	17	10
" 29 ...	42	5	33	0	30	11	27	10	22	10	25	5	20	0	18	3	18	3
May 6 ...	40	9	32	6	31	4	27	7	22	7	25	7	20	3	18	2	18	6
" 13 ...	41	6	32	1	31	8	27	3	22	0	25	1	20	6	18	1	19	0
" 20 ...	42	8	31	10	32	6	27	0	21	8	25	4	20	11	17	8	19	2
" 27 ...	42	6	31	3	32	8	26	3	21	4	25	0	21	0	17	10	19	5
June 3 ...	43	1	30	2	32	5	25	7	21	8	24	10	21	3	17	10	19	5
" 10 ...	42	11	29	1	32	4	26	10	20	9	25	7	21	4	17	10	19	7
" 17 ...	42	7	29	0	32	3	26	10	18	11	23	11	21	6	18	0	19	8
" 24 ...	42	8	29	4	31	11	27	2	20	1	23	9	21	7	17	9	19	10
July 1 ...	42	9	29	9	31	10	27	2	19	11	24	5	21	9	17	7	19	9
" 8 ...	43	0	30	4	32	1	26	4	19	5	25	10	21	8	17	4	19	9
" 15 ...	44	3	31	1			26	10	21	3			21	9	17	7		
" 22 ...	44	0	31	11			27	4	19	9			22	5	17	5		
" 29 ...	43	5	33	5			24	6	20	10			22	2	18	1		
Aug. 5 ...	44	9	33	9			27	4	20	5			22	11	18	3		
" 12 ...	44	9	33	5			24	9	20	4			21	8	18	0		
" 19 ...	41	6	32	11			23	11	20	11			19	8	17	11		
" 26 ...	38	5	32	7			24	7	20	10			19	4	17	2		
Sept. 2 ...	37	2	32	2			26	3	22	10			19	6	17	2		
" 9 ...	34	11	31	11			26	1	23	3			18	5	17	2		
" 16 ...	33	6	30	11			26	5	24	3			17	9	16	6		
" 23 ...	32	9	30	2			26	8	24	2			17	7	16	3		
" 30 ...	32	2	30	1			26	9	24	4			17	2	16	4		
Oct. 7 ...	31	8	30	1			26	9	24	7			17	0	16	3		
" 14 ...	31	4	30	2			27	0	25	1			17	0	16	2		
" 21 ...	31	8	30	4			27	7	25	3			16	11	16	1		
" 28 ...	31	10	30	4			27	9	25	4			17	0	16	2		
Nov. 4 ...	32	5	30	4			27	9	25	6			17	0	16	2		
" 11 ...	32	5	29	11			27	7	25	4			17	1	15	11		
" 18 ...	32	7	29	8			27	0	25	1			17	4	16	1		
" 25 ...	33	0	29	11			26	8	24	10			17	3	16	4		
Dec. 2 ...	33	3	30	6			26	1	24	7			17	4	16	7		
" 9 ...	33	3	30	9			25	7	24	3			17	3	16	9		
" 16 ...	33	2	30	7			25	3	23	9			17	4	16	10		
" 23 ...	33	1	30	7			25	2	23	10			17	4	16	9		
" 30 ...	33	3	30	5			25	1	23	9			17	4	16	9		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel

**AVERAGE PRICES of Wheat, Barley, and Oats per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and BRESLAU.**

		WHEAT.		BARLEY.		OATS.	
		1910.	1911.	1910.	1911.	1910.	1911.
		<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
France :	May	42 1	46 9	25 9	27 2	21 10	22 8
	June	41 10	46 8	25 5	27 4	21 4	22 9
Paris :	May	44 0	49 3	24 8	25 7	22 3	23 11
	June	42 6	47 2	24 4	27 0	20 6	23 11
Belgium :	April	35 11	32 10	23 1	24 7	19 10	20 8
	May	35 4	34 11	23 8	24 11	20 1	21 10
Germany :	April	46 7	40 7	25 9	29 6	21 0	23 1
	May	44 0	42 5	24 10	29 2	20 7	24 2
Berlin :	April	48 3	42 10	—	—	21 11	22 3
	May	46 1	44 4	—	—	20 10	23 2
Breslau :	April	44 10	38 1	25 4*	27 7*	20 0	20 11
				24 2†	23 7†		
	May	41 0	39 7	25 4*	—*	19 6	22 7
				23 3†	24 9†		

\* Brewing.

† Other.

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the Belgian quotations are the official monthly averages published in the *Moniteur Belge*; the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

**AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of June, 1910 and 1911.**

			WHEAT.		BARLEY.		OATS.	
			1910.	1911.	1910.	1911.	1910.	1911.
			<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
London...	...	...	29 9	32 9	20 11	25 1	19 2	20 2
Norwich	...	...	29 6	32 8	22 3	23 4	17 0	19 6
Peterborough	...	...	28 0	31 5	18 10	24 10	17 1	19 1
Lincoln...	...	...	29 5	31 2	—	—	17 3	19 1
Doncaster	...	...	28 6	31 9	22 4	23 10	17 9	19 5
Salisbury	...	...	28 8	31 6	20 7	21 11	16 4	19 11



AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain  
MARKETS in ENGLAND and SCOTLAND in the Month of  
June, 1911.

(Compiled from Reports received from the Board's Market  
Reporters.)

Description.	Bristol.		Liverpool.		London.		Glasgow.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British ...	14 0	13 0	—	—	12 9	10 9	—	—
Irish Creamery	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
„ Factory	107 0	103 0	104 6	102 0	108 0	105 6	104 6	102 6
Danish ...	96 0	89 0	91 6	83 0	97 0	91 0	—	—
French ...	—	—	114 6	112 0	112 6	111 0	109 6	—
Russian ...	—	—	—	—	116 6	113 0	—	—
Australian ...	99 0	94 6	98 6	94 6	99 0	97 0	97 0	93 6
New Zealand	101 0	96 0	—	—	102 6	99 0	—	—
	107 6	104 0	—	—	106 6	104 6	—	—
CHEESE :—								
British—								
Cheddar ...	76 0	72 0	76 0	73 0	83 0	76 6	57 0	55 0
Cheshire ...	—	—	120 lb.	120 lb.	120 lb.	120 lb.	—	—
			62 6	57 6	74 0	68 6	—	—
Canadian ...	62 0	60 0	per cwt.	per cwt.	per cwt.	per cwt.	55 0	—
			55 6	54 6	64 0	62 6	—	—
BACON :—								
Irish ...	72 0	66 0	72 0	65 6	75 0	71 0	70 0	—
Canadian ...	62 6	59 0	62 0	58 6	63 0	61 0	—	—
HAMS :—								
Cumberland ...	—	—	—	—	105 6	99 0	—	—
Irish ...	—	—	—	—	108 0	104 0	101 0	—
American								
(long cut)	71 0	67 0	71 0	66 6	75 0	70 6	71 6	68 0
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British ...	8 11	—	—	—	9 9	8 11	8 5	—
Irish ...	8 10	8 6	9 0	8 3	9 2	7 10	8 4	7 10
Danish ...	—	—	9 4	8 10	9 6	8 4	—	—
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Langworthy ...	108 0	95 0	120 0	110 0	118 0	108 0	81 0	75 0
Scottish								
Triumph	110 0	100 0	106 6	96 6	109 0	99 0	—	—
Up-to-Date ...	107 0	93 6	106 6	96 6	113 0	102 0	75 0	70 0
HAY :—								
Clover	90 0	75 0	96 0	67 6	93 6	78 0	79 6	74 6
Meadow	77 6	60 0	—	—	83 0	62 0	—	—

## DISEASES OF ANIMALS ACTS, 1894 to 1910.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

## GREAT BRITAIN.

*(From the Returns of the Board of Agriculture and Fisheries.)*

DISEASE.	JUNE.		SIX MONTHS ENDED JUNE.	
	1911.	1910.	1911.	1910.
<b>Swine-Fever:—</b>				
Outbreaks ... ..	316	210	1,332	731
Swine Slaughtered as diseased or exposed to infection ...	4,180	1,832	14,977	6,508
<b>Anthrax:—</b>				
Outbreaks* ... ..	65	148	475	810
Animals attacked ... ..	91	168	592	981
<b>Foot-and-Mouth Disease:—</b>				
Outbreaks ... ..	—	—	1	—
Animals attacked ... ..	—	—	18	—
<b>Glanders (including Farcy):—</b>				
Outbreaks ... ..	16	27	104	178
Animals attacked ... ..	32	94	272	501
<b>Sheep-Scab:—</b>				
Outbreaks ... ..	6	5	303	315

\* For 1910 the figures show the outbreaks reported, but for 1911 the outbreaks confirmed.

## IRELAND.

*(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)*

DISEASE.	JUNE.		SIX MONTHS ENDED JUNE.	
	1911.	1910.	1911.	1910.
<b>Swine-Fever:—</b>				
Outbreaks ... ..	14	17	63	57
Swine Slaughtered as diseased or exposed to infection ...	158	435	974	1,341
<b>Anthrax:—</b>				
Outbreaks ... ..	—	—	5	4
Animals attacked ... ..	1	1	6	7
<b>Glanders (including Farcy):—</b>				
Outbreaks ... ..	1	—	2	1
Animals attacked ... ..	1	—	3	2
<b>Sheep-Scab:—</b>				
Outbreaks ... ..	6	7	242	333

## SELECTED CONTENTS OF PERIODICALS.

**Agriculture, General and Miscellaneous—**

- Weeds and their Destruction, *H. C. Long*. [B. 20-3.] The Chemistry of the Proteins, *T. B. Wood*. [B. 22-5.] (Trans. Highland and Agr. Soc. Scot., 5th Series, Vol. XXIII., 1911.)
- France. Les écoles d'agriculture d'hiver, *J. B. Guillon*. (Bul. Mens. Off. Renseig. Agr. [Paris], April, 1911.) [B. 44-7.]
- Guano Deposits of Assumption Island, Seychelles. [B. 24-3.] Preparation of Calcium Cyanamide and its uses as a Manurial Agent. Part I. [B. 28-3.] (Bul. Imperial Inst., Vol. IX., No. 1, 1911.)
- Tableau de l'agriculture chilienne en 1910, *S. Cubillos-Valdivieso*. (Ann. Sci. Agron., May, 1911.) [A. 84.]

**Field Crops—**

- Experiments in Crossing Turnips, *John H. Wilson*. [C. 32; B. 17.]
- Improvement of Hill Pasture as Determined by the Effect on Stock, *James Hendrick*. [C. 42-9.] Grass and Clover Seeds at Cockle Park, *Professor Gilchrist*. [C. 42-1.] (Trans. Highland and Agr. Soc. Scot., 5th Series, Vol. XXIII., 1911.)
- Beet Sugar Factories, *H. Williams*. (Jour. Roy. Soc. Arts, May 12th, 1911.) [C. 34-5.]
- The Cultivation, Production, Preparation, and Utilisation of Castor Seed. [C. 58-1.] Utilisation of Para Rubber Seed. [C. 58-3.] (Bul. Imperial Inst., Vol. IX., No. 1, 1911.)
- The Ethics of Food. III. Bread. (Sci. Prog., No. 20, April, 1911.) [C. 6.]
- The Growth of Tobacco for Nicotine Extraction, *G. H. Garrad*. [C. 54; E. 20-5.] The Soya Bean as an English Crop, *H. P. Hutchinson*. [C. 44-5.] On the Raising of New Varieties of Hops, *E. S. Salmon*. [C. 10.] The Estimation of Soft Resins in Hops, *R. H. Carter*. [C. 10.] (Jour. South-East. Agr. Col., Wye, No. 19, 1910.)

**Plant Diseases—**

- Investigations on Potato Diseases, *G. H. Pethybridge*. [E. 60-37.] The "Bladder-Rust" of Scots Pine, *G. H. Pethybridge*. [E. 60-17.] (Dept. Agr. and Tech. Instr. Ireland Jour., April, 1911.)
- Notes on Fruit Flies (*Trypetidae*) with Descriptions of New Species, *W. J. Froggatt*. (Proc. Linn. Soc. N.S. Wales, Vol. XXXV., Part 4, 1910.) [E. 40-15.]
- Fifth Annual Report of the Honorary Consulting Biologist to the Land Agents' Society, *W. E. Collinge*. (Jour. Land Agents' Soc., June, 1911.) [E. 2.]
- Italie. Loi du 24 mars 1904 pour la destruction de la *diaspis pentagona*. Règlement pour l'application de la loi du 24 mars, concernant la destruction de la *diaspis pentagona*. [E. 6.] La *diaspis pentagona*, *G. Gastine*. [E. 40-51.] (Bul. Mens. Off. Renseig. Agr. [Paris], April, 1911.)
- Untersuchungen über die Wirkung des Karbolineums als Pflanzenschutzmittel, *E. Molz*. (Centbl. Bakt. [etc.], 2<sup>e</sup> Abt., Band 30, Nos. 7-12, 1911.) [E. 20-5.]
- The Chemistry of the Lime-Sulphur Wash, *W. B. Burgess*. [E. 20-5.] "Sooty Blotch," a New Fungous Disease of Apples, *E. S. Salmon*. [E. 60-11.] "Brown Rot," Canker of Apple Trees, *E. S. Salmon*. [E. 60-11.] On the Occurrence of New York Canker in England (*Sphaeropsis malorum*), *E. S. Salmon*. [E. 60-11.] (Jour. South-East. Agr. Col., Wye, No. 19, 1910.)

**Live Stock—**

- Origin of the Clydesdale and other Heavy Breeds of Horses, *J. Cossar Ewart*. (Trans. Highland and Agr. Soc. Scot., 5th Series, Vol. XXIII., 1911.) [F. 64-1.]



**Dairying and Food, General—**

Variation in the Composition of Cows' Milk with Advance of Lactation, *C. Crowther*. [G. 56-3.] Cost of Winter Feeding in Milk Production, *M. J. R. Dunstan*. [G. 50-1.] Influence of Temperature on Milk Yield, Ventilation of Cow Byres, *C. Douglas*. [G. 50-5.] Milk Records, *C. Douglas*. [G. 56-7.] (Trans. Highland and Agr. Soc. Scot., 5th Series, Vol. XXIII., 1911.)

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The Warble Fly. (Dept. Agr. and Tech. Instr. Ireland Jour., April, 1911.) [H. 50-5.]

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**Birds, Poultry, Bees, &c.—**

Grouse Disease, *A. E. Shipley*. (Sci. Prog., No. 20, April, 1911.) [K. 18-3.]

**Forestry—**

The Need of Afforestation in the United Kingdom of Great Britain and Ireland. I., *A. D. Blascheck*. (Sci. Prog., No. 20, April, 1911.) [L. 2-1.]

Afforestation in Scotland; Forest Survey of Glen Mor and a Consideration of Certain Problems arising therefrom, *Lord Lovat and Capt. Stirling of Keir*. (Trans. Roy. Scot. Arbor. Soc., Vol. XXV., 1911.) [L. 2-1.]

**Economics—**

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Cheshire County Council Small Holdings, *W. McCracken*. (Trans. Surv. Inst., Vol. XLIII., Part XII., 1911.) [N. 14-5.]

Historical and Statistical Sketch of the Present State of Agricultural Co-operation in Germany. [N. 4-7.] Co-operative Land Credit Societies in Germany. The "Landschaften" and "Ritterschaften." [N. 6-5.] Agricultural Co-operation in Austria. [N. 4-7.] The New [1910] Legislation for the Preservation of Peasant Property in Austria. [N. 10-3.] Agricultural Co-operation in Denmark. [N. 4-7.] Agricultural Co-operation and Organisation in the United States. [A. 80; N. 4-7.] Agricultural Organisation in Great Britain and Ireland [including Co-operation and Credit]. [A. 2; A. 22; N. 4-3.] The Present State of Agricultural Co-operation in Italy. [N. 4-7.] Co-operation in Japan. [N. 4-7.] (Bul. Econ. and Social Intel., Int. Inst. Agric., Vol. I., No. 1, Sept., 1910.)

Present Condition of Agricultural Association in Germany. [A. 28; N. 4-7.] The Organisation of Agricultural Credit in Turkey. [N. 6-5.] The Taxes and Fiscal Questions affecting Co-operative Societies in Italy. [N. 4-7.] Agricultural Co-operation in Norway. [N. 4-7.] Agricultural Co-operation in the Netherlands. [N. 4-7.] Agricultural Co-operation and Association in Portugal. [A. 46; N. 4-7.] Agricultural Associations in Roumania. [A. 54; N. 4-7.] Agricultural Co-operation in Sweden. [N. 4-7.] Organisation of Agriculture in Switzerland [including Co-operative, Credit and Insurance]. [A. 52; N. 4-7.] (Bul. Econ. and Social Intel., Int. Inst. Agric., Vol. I., No. 2, Oct.-Nov., 1910.)

Present Condition of Non-Co-operative Agricultural Association in Austria. [A. 34.] Agricultural Organisation in Belgium [including Co-operation, Credit and Insurance]. [A. 25; N. 4-7.] Organisation of Agriculture in Cuba [including Credit]. [A. 100; N. 6-5.] Agricultural Co-operation in British India. [N. 4-7.] The Agricultural Associations in France—The Agricultural Syndicates and Unions Derived from them. [N. 4-7.] Agricultural Co-operation in Servia. [N. 4-7.] (Bul. Econ. and Social Intel., Int. Inst. Agric., Vol. I., No. 3, Dec., 1910.)

## ADDITIONS TO THE LIBRARY.

[NOTE.—The receipt of *annual* publications of foreign agricultural and other departments, experiment stations and societies is not noted in the monthly list of additions to the Library. A list of these publications appeared in the *Journal* for October, November, and December, 1909.]

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*Burton, J. H.*—The Teaching of Nature Study. [Reprinted from the Jnl. of the Bath and West and Southern Counties Socy., Vol. V. Fifth Series.] (8 pp.) Bath, 1911. [B. 44-1.]

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System of Departmental Accounts for Agriculture. Leicester: J. McQueen and Co. 15s. 9d. [B. 50.]

Australia, Its Land, Conditions and Prospects. The Observations and Experiences of the Scottish Agricultural Commission of 1910-11. (303 pp.) London: W. Blackwood and Sons, 1911. 1s. net. [A. 85.]

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*Hopkins, Cyril G.*—Soil Fertility and Permanent Agriculture. (653 pp.) London: Ginn and Co., 1910. 10s. 6d. [B. 40-1.] [The author is the Professor of Agronomy in the University of Illinois.]

*Seltensperger, C.*—Lectures Agricoles. (576 pp.) Paris: J. B. Baillière et Fils, 1911. 6 fr. [B. 8-1.] [A collection of papers by well-known French agricultural writers.]

*Russell, E. J.*—Lessons on Soil. (132 pp.) Cambridge: University Press, 1911. 1s. 6d. [B. 40-1.]

*Pammel, L. H.*—Weeds of the Farm and Garden. (281 pp.) New York: Orange Judd Co., 1911. 7s. 6d. net. [B. 20-1.]

*Massachusetts Agricultural Experiment Station.*—Bull. No. 137:—The Rational Use of Lime. The Distribution, Composition and Cost of Lime. (19 pp.) Amherst, Massachusetts, 1911. [B. 24-5.]

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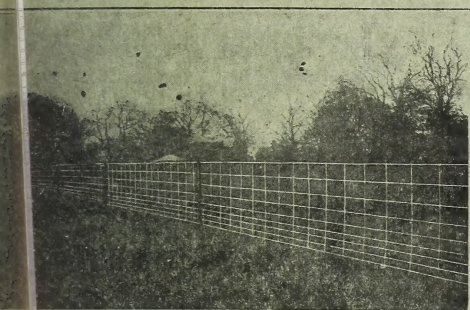
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